OFFICIAL RESPONSE
OF THE DIRECTOR OF THE CALIFORNIA
DEPARTMENT OF FORESTRY AND FIRE PROTECTION
TO ENVIRONMENTAL ISSUES RAISED DURING
THE TIMBER HARVESTING PLAN EVALUATION PROCESS

THP Number	4-08-005/CAL-1
County	Calaveras
Submitter	Sierra Pacific Industries
Location	Sections 13,14,15,22,23,24,26,27;T7N;R15E & Secs. 19,30:T7N;R16E, MDM&B
Acres	452 Logging Acres
Silvicultural Methods	Selection, Clearcutting, Shelterwood Removal Step
End of Public Comment Period	April 1, 2009
Date of Approval and Response	April 10, 2009

The California Department of Forestry and Fire Protection (CDF, CAL FIRE) prepared the following response to issues raised during the review and evaluation of the above referenced Timber Harvesting Plan (THP) in conformance with 14 CCR Sec. 1037.4. The regulations say that CAL FIRE is to consider all written comments and respond in writing to issues raised. In the attached Official Response, comments made on similar topics are grouped together and addressed as a single issue. Remarks concerning the validity of the review process, questions of law, or topics so remote or speculative that they cannot be reasonably assessed were considered by CAL FIRE, but are not addressed in writing, as they are not considered to be issues concerning the particular THP project that is the subject of this Official Response.

Subsequent to the March 11, 2008 submittal of the THP, information and changes which could be considered significant were added to the respective plan's record. In accordance with the California Environmental Quality Act (CEQA) §21092.1, and Guidelines 14CCR §15088.5; and the Forest Practice Act PRC §4582.7, and Rules 14 CCR §§ 898.1(d) and 1037.4, the public comment period for the THP was extended for 30 days.

Sincerely,

Michael J. Bacca

Michael J. Bacca
Forester II, Forest Practice Manager
RPF # 2236

STAFF FORESTER: Fresno

cc:Tuolumne Calaveras Unit	Ebbetts Pass Forest Watch
Calaveras County Planning	Foothill Conservancy
California Department of Fish and Game	Sierra Club, Mother Lode Chapter
California Department of Parks and Recreation	Susan Robinson
Central Valley Regional Water Quality Control Board	Steve Wilensky
Central Sierra Environmental Resource Center	

OFFICIAL RESPONSE
TIMBER HARVEST PLAN #4-08-005/CAL-1

NOTIFICATION PROCESS

To inform the public of this proposed Timber Harvesting Plan (THP) and determine if there were any concerns with the plan the following actions were taken:

- Notice of the receipt of the plan was submitted to the county clerk for posting with other environmental notices (ref. 14CCR §1032.8).
- Notice of the plan was posted at the Department's local office and also at the *regional* office in Fresno (ref. 14CCR §1032.8).
- Notice of the receipt of the THP was sent to those organizations and individuals on the Department's list for notification of plans (ref. 14CCR §1032.9(b)).
- A "Notice of the Intent to Harvest Timber" was posted near the plan site (ref. 14CCR §1032.7).
- A "Notice of Intent to Harvest Timber" was mailed to all property owners within 300 ft. of the plan boundary, where applicable (ref. 14CCR §§1032.7(e) & (f)).

In addition, the Department determined that a pre-harvest inspection (PHI) was required to take place on the site of the proposed operation before a decision could be made on the proposed plan. The review of this plan resulted in site-specific measures being incorporated into the THP. With the addition of these protective measures CAL FIRE determined there would be no significant adverse or cumulative impacts resulting from this plan.

PUBLIC REVIEW AND COMMENT

As part of the review process, the THP and other documents are available for public review and comment. THPs are available from the CAL FIRE Regional Office in Fresno CA; and, at the CAL FIRE Ranger Unit Office in San Andreas, CA. THPs can be reviewed free of charge at these offices, however there is a charge for removing copies from the CAL FIRE office. The cost depends on the THP's size.

Review Team meetings occur in Fresno and, insofar as possible without disrupting the work of the team, the public may attend. The chairperson of the Review Team may impose limitations on the scope of any public participation or the number of persons who attend the meetings in the event space is limited. 14 CCR Sec. 1037.5(d). The meetings are not public hearings, however if any public is interested in attending, they can contact CAL FIRE in Fresno to obtain the time and place of the Review Team meetings.

Subsequent to the submittal of the THP, information and changes which could be considered significant were added to the respective plan's record. In accordance with the California Environmental Quality Act (CEQA) §21092.1, and Guidelines 14CCR §15088.5; and the Forest Practice Act PRC §4582.7, and Rules 14 CCR §§ 898.1(d) and 1037.4, the public comment period for the THP was extended for 30 days.

THE THP REVIEW PROCESS

GENERAL LAWS AND REGULATIONS

Statute law governs the THP review process. These laws include, but are not limited to, the Z'berg-Nejedly Forest Practice Act ([FPA] Division 4, Chapter 8, California Public Resources Code (PRC), Sections 4511--4628) of 1973, Timberland Productivity Act of 1982, California Environmental Quality Act (CEQA) of 1970, Porter Cologne Water Quality Act, and various laws that are concerned with protection of rare, threatened or endangered species. The State Board of Forestry and Fire Protection (BOF) determine administrative rules found in the California Code of Regulations (CCR) based on the authority granted to the BOF by the legislature as found in the Public Resources Code. One of the founding principles of the PRC as adopted by the legislature is found in PRC Sec. 4513, titled INTENT OF LEGISLATURE, as follows; "*It is the intent of the Legislature to create and maintain an effective and comprehensive system of regulation and use of all timberlands so as to assure that: (a) Where feasible, the productivity of timberlands is restored, enhanced and maintained. (b) The goal of maximum sustained production of high-quality timber products is achieved while giving consideration to values relating to recreation, watershed, wildlife, range and forage, fisheries, regional economic vitality, employment, and aesthetic enjoyment.*" The CCR's purpose is to implement these laws (14 CCR 896).

The Board of Forestry and Fire Protection intended the CCRs to provide an exhaustive set of criteria for reviewing THPs. The CCR serves as detailed, explicit instructions regarding permissible and prohibited actions of on-the-ground harvest operations. Some major Articles included in the CCRs are:

Article 3. Silvicultural Methods
Article 4. Harvesting Practices and Erosion Control
Article 5. Site Preparation
Article 6. Water Course and Lake Protection
Article 7. Hazard Reduction
Article 9. Wildlife Protection Practices
Article 12. Logging Roads and Landings
Article 14. Archeological and Historical Resource Protection

THE MULTI-DISCIPLINARY REVIEW

A THP is prepared by a Registered Professional Forester (RPF) who is licensed by the State after passing education requirements and exams. CAL FIRE, which is a public agency having numerous RPFs on staff, independently reviews a submitted THP by using a multi-disciplinary Review Team. This team normally consists of, but is not limited to, representatives of CAL FIRE (team leader), the Department of Fish and Game (DFG), a representative of county government when the county so requests, and the Regional Water Quality Control Board (WQ) and the California Geological Survey (CGS). CAL FIRE can call upon other expertise to assist in review including, but not limited to, hydrologists, soil scientists, federal agencies, archaeologists, fire experts, tribal groups, and many others.

The Review Team meets when the THP is first received to make a preliminary determination regarding the THP's conformance to the CCRs. The team then may recommend a site-specific preharvest inspection (PHI) to determine whether the THP accurately describes ground conditions, whether the measures proposed are appropriate, and whether additional mitigation measures are necessary. Team members may attend the PHI, which is usually conducted by a local CAL FIRE Area Forester assigned to one of the Ranger Units in a particular county, and CAL FIRE may request attendance by other experts and agency personnel. The PHI often results in additional mitigation measures to better insure environmental protection. A second Review Team Meeting is convened to look at the report from the local CAL FIRE Area Forester, examine any public comment or comment from concerned agencies and determine whether the THP should be approved as written, approved with extra mitigation measures, or denied. Letters and copies of PHI reports may be sent out to the RPF who prepared the THP with a number of recommendations that the Review Team members find are necessary to bring the THP into conformance with the law and lessen any potential for environmental impacts.

For THP 4-08-005/CAL-1, the plan was first received on March 11, 2008 and was found acceptable for filing on March 21, 2008. The Review Team ordered a PHI to occur. The PHI occurred on April 28 & 29, 2008. Present on the PHI from CAL FIRE were Forest Practice Inspectors Tom Tinsley, Alan Peters, Mike Bacca along with Archaeologists Gerrit Fenenga and Tony Overly. From SPI were Ed Struffenegger, Frank Mulhair and Biologist Kevin Roberts. From RWQCB was Chris Cochrane. From CGS was Bill Short. Dan Applebee and Rhianna Lee attended from DFG. Mark Stewart represented EBMUD. Local government sent Supervisor Steve Wilensky and Bob Dean from the Calaveras County Water District. The PHI ended on April 29, 2008.

The Review Team met for the second review of the THP following the PHI to review the THP, PHI report, and to consider the public comments that had been received. The Review Team examined mitigation measures already submitted in order to insure that the revised plan was in conformance with the CCR and to insure that environmental concerns were addressed in order that no potential for significant adverse environmental impacts would be likely to occur from the timber harvest operation and associated activities.

TIMBER HARVEST AND STOCKING COMPLIANCE

Timber harvest may start after THP approval and continue for up to three years. CAL FIRE grants extensions under special circumstances for up to two more years, for a total of five years. The THP submitter must notify CAL FIRE before starting harvest operations.

CAL FIRE inspects the harvest operation for CCR compliance, although the number and frequency depends on the size, duration, complexity, regeneration method, and potential for adverse impacts. The THP and CCRs provide the criteria that CAL FIRE uses to determine compliance. CAL FIRE's policy is to vigorously pursue the prompt and positive enforcement of the FPA, CCRs, and related laws and regulations applying to timber operations on non-federal lands in California. The policy's intent is to prevent forest practice violations, and achieve prompt corrective action if violations do occur.

Enforcing the FPA, CCRs, and other related laws and regulations include issuing violation notices, imposing civil penalties and criminal court proceedings. Licensed Timber Operator (LTO) and Registered Professional Forester (RPF) licensing actions may also be pursued. Most forest practice violations are correctable, and CAL FIRE insures they are corrected. Non-correctable violations that result in harm to the environment often result in criminal court actions against the offender. Normally some sort of correction work is required to help offset non-correctable adverse impacts when the offender is found guilty.

A THP Completion Report must be submitted certifying that the area meets CCR requirements. CAL FIRE inspects completed work to insure compliance with the CCRs. Stocking standards are to be met immediately following completion of the timber operations for some silvicultural methods or may be required five years after completion of timber operations where methods are used that require artificial or natural regeneration to successfully take place so that the area is restocked with seedlings.

THP PROPOSED ACTIONS

The following is a summary of some of the contents and objectives from THP 4-08-005/CAL-1. This summary is not intended to replace anything that is actually found in the THP as approved and is merely provided for the convenience of the public who has submitted written comments. An actual copy of the approved THP may be obtained for a fee by writing to CAL FIRE, 1234 E. Shaw Ave, Fresno, CA, 93710. Some of the rules and regulations are also summarized in this document in order to provide the reader with an understanding of their content and restrictions. However, a copy of the entire rule book can be purchased from CAL FIRE, or is available to look at for free on the Internet site: http://www.fire.ca.gov/resource_mgt/downloads/2009_Forest_Practice_Rules_and_Act.pdf.

GENERAL DESCRIPTION OF THE THP

The THP totals a net 452 logging acres located in Sections 13,14,15,22,23,24,26,27; T7N;R15E & Secs. 19,30:T7N;R16E, MDM&B in Calaveras County. The plan area is located at an elevation ranging from 4,500' to approximately 5,900', and is located in the Lower Blue Creek Planning Watershed, which is tributary to the North Fork of the Mokelumne River. Slopes are gentle to steep within the logging units. The project actually can be said to consist of some 21 individual even-age regeneration units where clearcutting is being used. Selection is being used primarily in WLPZ areas, and there is a unit where the Shelterwood Removal Step is being used. The clearcut units range in size from 12 to 26 acres and are generally separated by established plantations resulting from previous logging entries or areas that are not proposed for logging at this time.

The watershed assessment areas is described in the plan as being 8,320 acres of the Lower Blue Creek Planning Watershed, while the biological assessment area includes additional areas that are outside the watershed but within 1 mile of the project. Within this watershed area, SPI owns about 55% of the land and the federal government owns 43%, with the other area occupied by small private parcels.

The USFS does not have known activities planned in the coming 5 years in the assessment area, however there are discussions about potential future fuelbreak type harvests that could occur as a private/public venture. SPI does not report any definite probable future projects within the next 5 years, but other incidental salvage, fuel treatment or thinning may occur if needed. CAL FIRE assumes that private industrial timberland would be likely to have at the very least some type of salvage logging events to capture mortality on an on-going basis within the watershed. Private landowner logging in the watershed assessment area includes about 3,300 acres of past logging that was done on various THPs submitted between 1997 and 2001 which fit in the definition of "past projects". Among those past projects, the ones that are most spatially associated with the current THP are 4-98-84/CAL, 4-98-107/CAL and 4-01-73/CAL. While the current project would seem to apparently add another 438 acres to the past total acres logged in the watershed, it should be noted that several hundred acres of the THP overlap past logging areas and are already accounted for in the 3,300 acre total. Other than the past plans already mentioned, most of the other past projects are somewhat removed from the location of the current project and many of the past projects are nearing the end of the ten year period for disclosure required by the rules of the BOF. No past plans have occurred on SPI lands in this watershed in the past six years.

Possible cumulative effects are analyzed in the THP using the BOF methodology as found in Technical Rule Addendum #2. CAL FIRE found that the discussion is in compliance with the intent of the BOF regulations. The previous private industrial landowners were Georgia-Pacific, Georgia-Pacific West, American Forest Products, Bendix Corporation and other subsidiaries of these companies who tended to use primarily single tree selection, but added a minor component of seed tree or shelterwood methods and a small amount of even-age regeneration. Where individual tree selection methods were used, trees that are currently in the overstory of these logged lands were actually understory or slowly growing trees at a previous time. Species composition in some of these frequently logged areas tend towards fir and cedar species as pine was repeatedly removed due to the higher values. Thus, the current landowners have seen a need to use even-aged regeneration methods to remove the current stand and replace it with faster growing planted seedlings of a more desirable and historic species composition. CAL FIRE assumes that some additional entries are possible within a five year period. Recent changes in federal land management make it possible to make an assumption that logging which is designed to reduce the potential for fire hazardous conditions is also possible on USFS lands.

In addition to this watershed area, CAL FIRE also took into consideration known activities that have occurred in assessment areas other than the Lower Blue Creek Planning Watershed where there could be a potential for impacts to combine to create significant adverse individual or cumulative effects in the general vicinity of the THP area. CAL FIRE maintains a Geographical Information System to document the location and silvicultural methods of past and present projects. The CAL FIRE Forest Practice Inspector indicated in the PHI reports that projects inside and outside the immediate project location were considered in determining if the project would contribute to significant adverse direct or cumulative environmental impacts.

SILVICULTURAL METHODS

Silvicultural Methods are listed in the CCR as various harvesting methods that can be chosen by the RPF in order to generate forest products and insure that the timber stand can be perpetuated over time so that forest values will be protected and future harvests will be possible. The CCR requires the RPF to select systems and alternatives that achieve maximum sustained production of high quality timber products (14 CCR Sec. 953) and to meet the objectives of the Forest Practice Act (PRC 4512 & 4513).

This project proposes harvesting distinct and separated relatively small areas using even-age regeneration methods that are described as a clearcut and as Shelterwood Removal Step; and the uneven-age Selection method. Selection is being used within the Watercourse and Lake Protection Zones (WLPZ) of Class I and II watercourses. Where this method is being used, stocking will be met with at least 100 sq. ft. of BA on Site I lands and the residual stand shall contain 15 sq. ft. of BA of trees which are 18" dbh or greater. The total amount of selection that is being used is 54 acres.

There are 24 acres where Shelterwood Removal is being used in several small scattered areas. These areas will meet the 300 point count standard for stocking.

The other areas of the plan consist of 21 units of even-age regeneration using the Clearcutting silvicultural prescription. There will be 360 acres treated with this method in units that are generally less than 20 acres in size, although one unit is 26 acres in size. All units were observed to be greater than 300' apart. Post harvest stocking will be accomplished by 300 point count of planted seedlings per acre. These areas will be site prepped prior to planting. Herbicides are typically used by SPI to insure successful regeneration of the even-aged regeneration units and potential known impacts of these products were considered by CAL FIRE in analyzing this project.

Considering previously approved THPs and considering known probable future projects for the immediate area of the current THP, the area will have an assortment of various types of treatment including areas of Selection logging, plantations, areas that have been thinned, non-commercial and wet areas, and areas that have not recently been logged within the assessment area.

A ten year re-entry period has been fairly typical for central Sierra industrial timberlands where uneven-age silvicultural methods are used. Under the current THP that is the subject of this Official Response; even-age regeneration units will be replanted using artificial methods to insure that the areas will meet the requirements of 300 seedlings per acre alive and healthy within 5 years following the completion of timber operations. Consequently, re-entry periods will be expected to be significantly longer in the area where even-age operations have replaced the previous use of uneven-age methods.

HARVESTING PRACTICES AND EROSION CONTROL

The CCR states that timber operations shall be conducted to: meet the goal of maximum sustained production of high quality timber products; minimize breakage of merchantable timber; prevent unreasonable damage to residual trees, fish and wildlife habitat as identified in the THP, or contained in the rules, reproduction, and riparian vegetation; prevent degradation of the quality and beneficial uses of water; and maintain site productivity by minimizing soil loss. (14 CCR Sec. 954)

For this THP, the Plan Submitter proposes to harvest 438 net acres of conifer sawlogs, fiber logs, biomass and fuelwood with the approval of this THP. The proposed harvest method will be by ground based tractor, rubber tired skidder and feller/buncher equipment and one unit where skyline cable will be used. The RPF has also stated that cable operations may also be used in any tractor operating areas if it results in less ground disturbance and residual tree damage. The Erosion Hazard Rating for the area in the submitted plan was listed as Low, Moderate and High. The THP indicated two unstable areas. The THP area was examined in the office by a CGS geologist to confirm these findings and a member of CGS also attended the PHI. Additional mitigations to protect the unstable areas were added to the THP as a result of PHI recommendations.

The THP contains provisions for operating during the winter months. Winter operating restrictions include a provision that ground based operations could occur during dry rainless periods where soils are not saturated. Waterbarring on moderate EHR areas will be done to the high EHR standard and on high areas, to the extreme spacing standards during the winter. Winter operations will not occur in WLPZ's. Tractor roads shall not be constructed on slopes greater than 40% during the winter. Erosion control structures would be installed on all constructed tractor roads and seasonal truck roads prior to the end of the day if the US Weather Service forecasts a chance of rain the following day, and prior to the weekend or other shut down periods. Timber operations would be allowed to occur during dry cold weather or during dry rainless periods when soils are not saturated.

CAL FIRE has noted that past SPI THPs with winter logging provisions were typically only active during the early winter period before substantial rainfall has occurred and again late in the spring during years when the rainfall stopped and conditions had dried out substantially in the field.

SITE PREPARATION

The CCR states that site preparation shall be planned and conducted in a manner that encourages maximum timber productivity, minimizes fire hazards, prevents substantial adverse effects to soil resources and to fish and wildlife habitat, and prevents degradation of the quality and beneficial uses of water. (14 CCR Sec. 955)

Site preparation and planting will be needed in the harvested areas where Clearcutting is being used. Site preparation is also described for Shelterwood Removal areas. Mechanical site prep will be done using tractors or excavators on slopes under 40%. Areas may be ripped where slopes are below 40%. Mechanical site prep will not occur in WLPZs or ELZs. Slopes over 40% may be broadcast burned and firelines may be constructed within these areas. Broadcast burning will not occur in WLPZs.

The objective of mechanical site prep is to leave as much organic material as possible while providing planting locations and fire protection. A mix of tree species will be used to reforest the area and it is assumed that herbicides will be used to promote the growth of conifer seedlings in deference to competition for water, sunlight and nutrients from brush or grass species.

While no actual direct prescription for herbicide use was contained in the THP, CAL FIRE has extensively considered the potential for herbicide use from among the most commonly used products that have been approved for such reforestation use by State and Federal agencies. There are only a limited number of registered products that are used for vegetation management on these types of forested lands and CAL FIRE is aware of the type of products that have been prescribed by SPI in the past. These registered products were considered by CAL FIRE in analyzing the potential impacts of this project and are also analyzed in the THP that was available for public comment.

WATERCOURSE AND LAKE PROTECTION

A purpose of the CCR with respect to watercourse and lake protection is to insure the protection of beneficial uses that are derived from the physical form, water quality, and biological characteristics of watercourses and lakes. The BOF has stated its intent that the productivity of timberland be maintained, restored and enhanced while providing equal consideration for the beneficial uses of water. (14 CCR Sec. 956)

For this THP, there are Class I and II and III watercourses present that must be

protected from timber operations. The two Class I watercourses are protected by a WLPZ that varies in width from 75' to 150' on each side of the watercourse depending on the steepness of the side slope. There are ten Class II watercourses or segments that will be protected by a Watercourse and Lake Protection Zone which varies from 50 to 100 feet in width. There are approximately 18 Class III watercourses or segments that will be protected by an Equipment Limitation Zone of 25' and 50' wide depending on the steepness of the slopes, except for planned skid crossings of the watercourses.

The THP has one in-lieu watercourse practices where a landing is located within the WLPZ. The THP contains measures to mitigate the use of this facility.

DFG regulations require submission of a 1611 stream alteration agreement that must be approved prior to timber operations, that changes or alters the bed or bank of a watercourse.

The BOF methodology of determining cumulative watershed impacts was utilized in preparation of this THP. The conditions of streams as shown in the THP are mixed from poor to good. Reasons given for poor rating include severe storm events that occurred in 1997 where excessive rainfall occurred on a snowpack creating runoff conditions. This and previous plans in the area contain mitigations to resolve many of these problems. Without approval of this THP, there would be no regulations in place that would require maintenance of roads as these requirements are expiring on previously logged THPs.

HAZARD REDUCTION

It is the intent of the BOF to provide standards for the treatment of snags and logging slash to reduce fire and pest hazards on the logging area and to protect the area from potential insect and disease problems and to do this while retaining wildlife habitat. (14 CCR Sec. 957)

This particular THP does have roads that will require treatment of logging slash near the roadways as there is public access through the area. Slash treatment will be done by chipping and removal, slashing and broadcast burning, crushing and scattering or piling and burning within 50' of private seasonal roads open to the public. Slash will also be treated within 200' of occupied structures. Slash treatment is anticipated for the remainder of the project area where the clearcutting method is being used. While most slash piles will be burned, an occasional pile may be left for wildlife purposes.

Some reduction in the overall fire hazard of the area can be anticipated due to the even-age methods being used, opening and maintenance of roads, and creation of skid trails that would tend to provide a bare mineral soil break in fuel types. Over time, the reduction of fire hazard will tend to dissipate as the forest grows back and skid trails become covered with pine needles, seedlings and new vegetation. Eventually as the

evenaged structures develop they will become less likely to be damaged by ground fires and less likely to provide fire ladders and crowning fire conditions than the stands they are replacing.

WILDLIFE PROTECTION

The regulations state that timber operations shall be planned and conducted to maintain suitable habitat for wildlife species. (14 CCR Sec. 959).

This THP examines the potential impact of the logging on wildlife and finds that there is a potential for rare, threatened or endangered plant and animal species to occur in an area impacted by the timber operation. These findings resulted from a scoping check of the Natural Diversity Database, the DFG Rarefind program, the California Wildlife Habitat Relationship program, the SPI database of known locations for sensitive species, and discussions with the USFS. No actual location of sensitive species was confirmed prior to plan submittal, and instead, the plan listed protection and consultation measures to be initiated in the event that surveys done prior to the start of actual timber operations discover any of these species.

Two previously known locations of California Spotted Owls occur in close proximity to the THP project and one other further away was noted in the THP. Additional surveys will be conducted prior to the start of timber operations. Current SPI policy is to cease operations within ¼ mile of a located nest site until consultation with a biologist is initiated. The plan notes additional locations of California Spotted Owl within one mile of the project, but well outside the ¼ limit. It is noted that the California Spotted Owl does not currently have a status in the Forest Practice Rules as a listed species nor is there any specific regulations that pertain to the species.

CAL FIRE has been treating the owl with concern when they are known to exist near a project area. In general, harvesting could potentially have the effect of increasing the prey base for the California spotted owl by creating more habitat for some of its prey species, especially small mammals such as mice and pocket gophers. Where there is adequate nesting and roosting habitat, increasing the prey base generally enhances owl viability.

Within the biological assessment area, there are previously known locations of Northern Goshawk. One flying Northern Goshawk was noted during THP preparation, but a nest site was not located. Again, surveys will be conducted prior to actual logging in the area. DFG consultation would be required in the event that a Northern Goshawk was discovered and the rules of the BOF prescribe a protection area.

Amphibian surveys for the project area yielded no locations of Red-legged frog, western pond turtle (not an amphibian, but residing in the same habitat), mountain yellow-legged frog or foothill yellow-legged frog on the project area and there is no previously

recorded presence of the species within the assessment area itself. Foothill and mountain yellow-legged frog are not listed species, but which are in need of consideration with respect to their habitat. WLPZ protections for watercourses would likely provide some protection for these mentioned amphibian species if any were present. Western pond turtle was not sighted during THP preparations, but again, WLPZ protections should offer habitat protection for the species if any are present. Yosemite toad was recently identified by the USFWS as a potential species of federal concern, although the species is not listed at the present time due to inadequate staffing. In 2002 the FWS said: "The Yosemite toad is a high-elevation species found in the central Sierra Nevada mountains. The current range of the Yosemite toad extends from Ebbetts Pass in Alpine County to south of Kaiser Pass and Evolution Lake, Fresno County. The Yosemite toad commonly occurs at elevations between 8,000 and 10,000 feet. In making this finding, the Service recognizes that there may have been declines in the distribution and abundance of Yosemite toads. The best available evidence indicates that some toad populations have declined by at least 50 percent from historical levels. These declines are primarily attributed to habitat degradation, airborne contaminants and drought. Declines in Yosemite toad populations have occurred in Yosemite National Park, the heart of the species' range, and throughout the Sierra Nevada. More than 90 percent of Yosemite toad habitat occurs within U.S. Forest Service wilderness areas and on National Park Service lands. The Forest Service has proposed several standards and guidelines to protect and enhance the Yosemite toad and its habitat. One of these guidelines is to develop and implement a conservation strategy for the Yosemite toad with the Service. The Forest Service believes it can take measures to improve Yosemite toad habitat through better management of livestock grazing and fish stocking on lands that it manages." Information updated to March of 2008 the FWS says: "LAND OWNERSHIP: The vast majority of land within the range of the Yosemite toad is federally managed, with 919,011 ha (2,270,918 ac) (99 percent of the range) on USFS, NPS, and BLM lands. Much of this land is within designated wilderness. The remaining land within the species' range is a mix of State, local government, and private lands." _ Given this species range and elevation and landownership pattern there is little likelihood that this THP will impact this species.

Regarding Pacific fisher and pine marten, these animals are midsize predators and can utilize a good mix of different seral habitats. It should be noted that no Late Seral Stage (LSS) habitat is being harvested as a result of this THP and that a mosaic of logged, unlogged, plantation, WLPZs and other habitats will result from the approval of this THP. This type of mosaic should be conducive to fisher and pine marten foraging habitat as long as LSS habitat needed for den sites for the species is not being harvested.

Various plant databases were checked for the potential of rare or endangered plant species that might occur on the area. The plan states that there is a known occurrence of *Lomatium stebbinsii* adjacent to the proposed plan area. The plan also explains the possibility of finding locations for *Allium tribractteatum*, *Lomatium stebbinsii,Calochortus clavatus var avius*, *Mimulus pulchellus and Piperia colemanii* in the area. There is additional suitable habitat for several watch species including *Ceanothus fresnensis,*

Clarkia virgata, Cypripendium fasciculatum, Cypripedium montanum, Lilium humboldtii spp humboldtii, Mimulus laciniatus, Jensia yosemitana and *Sphenopholis obtusata* within or directly adjacent to the THP boundary. Surveys were not concluded for species, but surveys will be concluded prior to the start of any timber operations where conditions exist for the individual species. Mitigations are included in the THP to protect plants where they are found or if they are found during subsequent surveys. Regulations will not allow rare or endangered plant species to be adversely impacted by chemical spray activities.

Two other mammal species of concern were considered by the Department during the review of the THP. One of these was the Sierra Red Fox. However, using the scoping process described later in this Official Response, it does not appear likely that this project would have a potential for a significant adverse impact on the species. That is because some literature describes the range of the species to be between 3900' and 11,900' in the Sierra, but primarily above 6,000', where it could be present given the elevation of the project area. The species seems to prefer forested areas interspersed with open areas and a wide variety of habitats from alpine shrub, wet meadow, sub alpine conifer, montane chaparral and mixed conifer. The species eats small mammals like squirrels, gophers and rabbits and dens in rocks, hollow logs and stumps or burrows in the ground. Overgrazing in meadows has been described as the primary reason for decline. Additionally, the animal has a large home range from 900 acres to 8000 acres in size, so is able to search out preferred habitat over a large area. (Univ of NV, Reno) For this project area, it is noted that there will still be a variety of habitats as in the description of the preferred habitat for the species, with forested areas interspersed with open areas. The area actually harvested may add to the primary food supply as gophers, rabbits and squirrels are typical invaders that seem to do well in clearings, especially when planted with seedlings. The harvested area would also be expected to contain stumps, hollow logs and areas of rock and ground suitable for denning for the species.

Another species considered, as described briefly above, is the Pine Marten, and this species is described in some of the literature as being more common above 7,000 feet. (Storer and Usinger 1974). The animal has been known to travel up to 15 miles a day in search of food, so it can cover a wide variety of areas and habitats. (Ingels 1965). It eats grasshoppers, birds, ground squirrels and chipmunks, and even yellowjacket wasps in the fall; all of which could be expected to do well in the logged areas. It seeks shelter in tree cavities and rocks, both of which would still be present either on the project area in WLPZ retention areas or in the intervening unlogged units. From Spencer et al. (1983), Pine Marten studies done in the Tahoe National Forest showed strong presence for lodgepole pine associations and they selected against brush, mixed conifer and Jeffrey pine types at elevations below 7,000 feet. Above this elevation, Pine Marten strongly preferred red fir forest types. The THP does not contain areas of either type of favored habitat for Pine Marten.

The Salt Springs Deer Herd utilizes a portion of the project area primarily as

intermediate range and a very small area of winter range. The intermediate range covers a very large area for a deer herd and the plan occupies only a less than significant portion of the total. There are no significant areas of critical fawning areas, critical summer range, or critical winter range for deer in the portion of the THP which are habitat for the Salt Springs Deer Herd. The resulting mix of silvicultural types where stocking will be meet upon completion, even-aged openings, WLPZs, non-timbered areas, plantations and non-logged areas will allow for production of edge and a return to early successional vegetation types in some of these areas that are favorable for deer habitat.

A letter was submitted to the THP file from DFG dated August 29, 2001 which indicated that the nearby Railroad Flat deer herd had been declining for years, possibly as long as 30-40 years. Reasons for the decline were attributed to drought, residential and commercial development, and fire suppression efforts. The letter states, "*The impacts of timber harvesting to deer are variable, but Department deer biologists feel that some timber practices, if done with proper consideration for wildlife needs, can actually benefit California's deer herds.*" The letter also states, "*Our timber harvest review staff conduct desk reviews of all timber plans that we receive, and we currently conduct field reviews of 20-25 percent of these same plans. Desk and field reviews result in recommendations intended to protect and conserve aquatic and terrestrial resources, including deer, from adverse environmental impacts. These recommendations include retention of oaks and other wildlife habitat attributes where appropriate." (Curtis 2001)* CAL FIRE notes that copies of this particular THP were sent to DFG for their review and input concerning not just deer, but all other species that might be adversely impacted by the proposed timber harvest operations.

Stated in the "Report to the Fish and Game Commission (California Department of Fish and Game 2001) is a finding that deer populations have declined greatly in the Central Sierra Nevada over the past five decades and that:

> *Openings of forests as a result of post World War II logging activities (Laudenslayer and Darr 1990) likely contributed to the final peak in deer numbers in the 1960's. Deer numbers then began to decline as those forests began to "close" again. The relationship between understory forage (herbaceous and shrub) and overstory canopy is typical of much of California's forested ranges – as canopy increases, forage decreases. The expansion of urbanization and residential development on private lands into the Sierra Nevada on both the West and East slopes further reduces available deer habitat, virtually eliminating the potential to purposely restore large-scale disturbances, such as fire, into the system in many areas. It's well-documented that deer thrive on early successional vegetation in forested communities (Leopold 1950, Wallmo and Schoen 1981), and there is a period encompassing about 2-30 years following major disturbances such as fire or logging when herbaceous and shrub species are abundant, available, and in the highest quality. Livestock and*

perhaps hundreds of largely unstudied species of wildlife such as blue grouse or mountain quail, also rely on the vegetation produced in forest openings where sunlight is allowed to "hit the ground" and enable plants to grow and be available for consumption or as cover. (pg. 18)

Also stated in the report for the area known as DAU 5 - Central Sierra Nevada, which is the area of concern to the proposed THP, is that:

The main habitat issues affecting deer in the DAU are associated with forestry practices, lack of habitat disturbance that favors early successional communities, and overuse by livestock on key summer range habitats. Human development and encroachment onto private wildlands has been significant in many areas. Presence of this urban interface, adjacent to public lands, restricts options for use of fire to manipulate habitat, thereby resulting in declining early successional habitat. (pg 35)

It can be stated that there are only a couple kinds of disturbances that are practical and available to improve habitat for deer and other early successional wildlife on private forestlands in California. One of these is fire, both man-made and natural, and the other is harvesting or some other similar management technique. The report clearly indicates that disturbance from fire is increasingly difficult to achieve given rising populations in these areas of the Central Sierra Nevada. Even man-made fire has become increasingly difficult to accomplish due to political restrictions and objections to the addition of smoke and particulate into the air and given the sensitivity of the populous to breathing air infused with smoke and ash.

CAL FIRE finds that opening up the canopy using silvicultural techniques that allow sunlight to reach the ground is still an economical and politically achievable way of increasing forage opportunities for deer and other early successional wildlife. Within the area of the project, there will be openings created which will allow for not only the establishment of a new generation of conifer seedlings, but also will encourage production of grass, herbs and forbs for deer foraging. While herbicides are expected to be used which would set-back or delay the development of these plant species, plants will not be eliminated by such use. There was determined to be an insignificant impact to the deer herd and recovery of the areas will be expected to be rapid, thereby returning cover to the affected areas so that any impacts would be temporary. There is no expectation of any significant adverse environmental impacts to wildlife or sensitive plants as a result of this project.

LOGGING ROADS AND LANDINGS

The rules state that all logging roads and landings shall be planned, located, constructed, reconstructed, used, and maintained in a manner which; is consistent with the long-term enhancement and maintenance of the forest resource; best accommodates appropriate yarding systems, and economic feasibility; minimizes damage to soil resources and fish and wildlife habitat; and prevents degradation of the quality and beneficial uses of water. (14 CCR Sec. 963).

For this THP, many of the roads and landings that will be needed were largely in place due to previous logging. The THP proposes road reconstruction and projects to improve drainage and proposes minor re-construction of temporary. These roads will be obliterated upon completion of timber operations.

Due to approval of this THP, regulations will be in place to require long-term road maintenance. Because of the current THP, road maintenance will be required for the period of time that the plan is active, or about 3 years time, and an additional year beyond work completion. Without the approval of this plan, the roads could become a source of sediment and could be in a worsening condition. Approval of this plan will therefore result in an improvement in the condition of the watershed and reduce sediment sources from roads. Likewise, numerous road crossings of watercourses will be improved with culverts or rocking.

ARCHAEOLOGICAL AND HISTORICAL RESOURCES

The purpose of the forest practice rules with respect to archaeological and historical resources is to ensure that significant sites within the area are adequately identified and protected and to provide direction to RPFs preparing THPs, Licensed Timber Operators and CAL FIRE in its review, approval and inspection programs. (14 CCR Sec 969). The results of field surveys made and mitigations designed to protect these resources are found in a portion of the THP file that is kept confidential pursuant to Government Code Sec. 6254 and 6254.10 and are not included in any documents provided to the public. (14 CCR Sec. 895.1). This is done to protect any of these resources from possible vandalism. This confidential addendum in the THP is written by an archaeologist or RPF who has been trained in archaeology and certified. It is reviewed in CAL FIRE by either a professional archaeologist or a CAL FIRE RPF trained in archaeology, or both, and the timber operation itself is inspected by a CAL FIRE forest practice inspector who has had this training. Copies of the confidential addendum are sent to local tribal groups, if they are on a list that is maintained by the Native American Heritage Commission, so that their input and expertise can be sought to assist in the review of the protections for these features.

ISSUES

One comment letter (and a later amended letter from the same party) was received from the public concerning this THP and the issues dealt with concerns about the protection of oak resources, impacts to deer forage, retention of snags, protection of furbearers and raptors and special status plant and animal species, protection of watershed resources, deer habitat protection, use of herbicides, adequacy of the discussion about consideration of cumulative impacts. Another comment letter was received which was duplicated for this and several other plans that contained quotes from a plantation diversity study from the plan submitted that was unpublished and therefore unavailable for comment. Two other letters were received on the subject of the alleged inadequacy of the SPI Option "a" document due to the possible impacts that might be expected on forest growth as a result of "global warming". Another email was received containing aerial photos showing the current location of clearcut units in Section 26 and for which CAL FIRE has no comment other that to note the visual reference to which CAL FIRE already had access. Another email was received referencing plant surveys and CAL FIRE provides a response to this letter below in Concern # 7. Two other emails were received referencing water drafting locations and details which are alleged to be missing in the THP and also showing a photo of an existing water drafting location on Blue Creek. Another email was received with concerns about the visual impact of the logging and traffic and noise from the logging and hauling operations. Two letters were received dealing with the same issue, which was the amount of logging that has previously gone on within the planning watershed area. One other letter was received citing a recent ruling by the Attorney General of the State of California and citing comments from a legal brief in a lawsuit against CAL FIRE and SPI on another THP, along with duplicative issues from some of the other letters listed above. The following Responses address the major concerns from these letters while other minor sub-issues may have already been addressed in the information contained above.

1. **Concern:** It was stated that, starting on page 48, the THP discusses "CEQA Alternatives Considered" as if to give fair consideration to alternative strategies to accomplish the project. On page 50, the top "checklist" for the project falsely shows that there are no reasonably potential significant adverse effects for biological resources, recreation, visual resources, and traffic. No matter whether the reader of this document (or the decision-maker) supports or opposes clearcutting as a treatment across this forested landscape, there is no possible way to claim that clearcutting 360 acres of habitat, denuding it further with site preparation, further attacking the native vegetation with herbicides, and then converting the site over time into a conifer tree plantation does create potential for significant impacts to wildlife, plants, and visual resources in the short term as well as the long term. It may be that appropriate mitigation can possibly reduce that significant potential

impact, but to show in the checklist that there is no potential, even without mitigation, is beyond any rule of reason. This bias towards the clearcut-chemical treatment project is consistent throughout the THP and especially in this section. The "No Project" falsely claims that there will be significant adverse impacts for watershed, soil productivity, biological resources, recreation, and visual resources if no project is done. This again defies basic logic, CEQA, and any argument of fairness. To leave a forested landscape to natural processes or to delay any logging, bulldozing, herbicide spraying, and tree farm conversion to some point out in the future cannot reasonably be claimed to cause a significant adverse impact. CEQA cannot possibly be so twisted. If it was, developers could claim that not bulldozing an oak woodland and converting it to lawns and houses would have a significant impact on the environment because fire or disease or reduced stand vigor or an unnatural shift in species composition might cause oaks, bushes, or other plants to die, bum, or be altered by natural conditions over time. The "Timing of Project" alternative also falsely claims that delaying treatment beyond 5 years will somehow cause significant adverse effects to the trees that aren't cut, the wildlife that doesn't lose habitat, the soil that doesn't get bulldozed, or the watershed that isn't denuded and exposed to storm events. This claim falls in the category of "big lie" propaganda, rather than providing an accurate and neutral consideration of alternatives to the proposed action. Any CEQA-equivalent analysis must be founded in reality, not misleading claims. Delaying clearcutting, bulldozing, and chemical treatments for 6 years or more cannot possibly be claimed to pose significant adverse harm to the existing forest, watershed, visual resources, or soil resources - despite the falsely marked checklist. On page 52 of the THP, the "Conclusion on Alternatives" paragraph claims that only Alternative #1, the proposed action, is compatible with the land use zoning category in which the majority of the property falls. This is again completely incorrect. Just as one example, the delayed cutting alternative is completely compatible with the land use zoning. The County does not require timberland owners to log sooner than biologically appropriate or to log in 5 years rather than 6 years. Given so many cumulative impacts from past even-age logging treatments across the timberlands of Calaveras County , SPI certainly has no mandate from the County under its zoning to force new, widespread even-age cut units onto @400 acres of now scenic, diverse, and healthy forest stands. This needs to be corrected in a revised THP. On page 54 of the THP, the authors acknowledge that the forests of California have had a decrease in the distribution of large trees across the landscape and that this trend is likely to continue. Despite acknowledging this decline, the THP authors fail to consider or to discuss an alternative that would leave scattered large trees (at least one per acre) for the life of the rotation in every even-age unit in the project, nor did the THP discuss other silvicultural options for retaining large trees for wildlife within the project's even-age units even though CSERC has specifically requested such consideration by SPI in past comment letters on THPs. Cutting down all large trees on 350 acres cannot possibly meet the need for wildlife species that are dependent upon large trees as a key component of their habitat. In this THP, SPI fails to consider a reasonable alternative that would spare some percentage of large trees within the even-age cut units outside of the WLPZ acres. The THP misleads by claiming that the forests of

California have seen a decrease in early seral components and suggesting that SPI's even-age management practices thus provide ecological benefits. SPI has converted at least 20,000 acres of Calaveras County timberlands to early seral stage in the last decade. In addition, vast areas have, indeed, been burned, including at least another 80,000 acres of conifer timberlands in Calaveras and Tuolumne Counties in the last two decades. A large percentage of-those acres are still in early seral condition. There is no essential need for more clearcut treatments for forest habitat benefit when there are so many thousands of acres of SPI clearcuts that have already gouged out open areas in the forest landscape over the past decade. On page 56, under "Wildlife Species Response to Habitat Changes Over Time," the authors, contend that most wildlife species have adapted to the changing conditions in the forests (caused by intensive logging, development, roads, fire suppression, etc.) and that only three vertebrate species are known to have been lost from the Sierra fauna in historic times. This fails to acknowledge that a host of amphibian and fish species have either been extirpated are in marked decline in the Sierra Nevada region. This fails to acknowledge that the Sierra Nevada red fox, wolverine, and fisher have been absent from any proven detections over the last 12 years in the specific portion of the central region of the Sierra Nevada where the project is proposed. The discussion of silvicultural alternatives leaves out any clear consideration of an alternative project treatment that would create more patchy even-age logging units that would contain structural habitat components that are important for at-risk species. There is no consideration of a silvicultural alternative that would leave a higher percentage of snags (something that would be both reasonable and feasible). There is no description of an alternative that would leave stringers or patches of large trees outside of the WLPZ areas or that would leave patches of mature oaks or higher levels of oaks that 2 or 3 per logging unit. The THP contains many pages of general information that SPI relies upon to come up with a management choice. Nevertheless, for a CEQA-equivalent document, there is no excuse not to discuss the benefits and drawbacks of applying a less intensive, more ecological beneficial silvicultural prescription across the 22 even-age units of the @400 acres. The amount of verbiage for the topic is not a measure of adequate consideration of alternatives. This THP fails to provide any clear consideration for an alternative that would modify the even-age cut units to leave more than the minimal retention areas, more than 2 or 3 oaks, or more than the minimal numbers of snags that are proposed for retention in the project.

Response: The requirement for a THP to contain the alternative language stems from a lawsuit in which the court required a discussion of alternatives to be included in each THP. There is no equivalent BOF regulation that describes how to accomplish this task or how to best conform to the court findings. The requirement to include an alternatives discussion in the THP was published by the Department as instructions to RPFs who are preparing THPs. A careful reading of 14 CCR Sec 15126.6 would seem to imply that a discussion of alternatives would be required where it was needed to lessen significant impacts *("The discussion of alternatives shall focus on alternatives to the project or its location which are capable of **avoiding or substantially lessening any significant effects** of the project..."*

emphasis added). Where there is a finding in the THP of no significant impacts (once the plan is mitigated and conforms to the rule requirements), then the discussion of alternatives becomes less meaningful.

With respect to the concerns listed above that reference delaying the harvest by five or six years, the project proponent is bound by terms included in it's Option "a" document which has been approved by CAL FIRE following an open public comment period. The document specifies how the company will manage its forested timberland resources for maximum sustained production of high quality timber products and the current project that is proposed for this period of time is consistent with the goal found in the Option "a" document. The Option "a" document prescribes practices that are to occur on a long-term planning horizon of 100 years. Additionally, rules of the BOF that prescribe the timing and spacing with respect to adjacent even-age regeneration units come into play in long-term planning. To delay harvesting of units that are adjacent to past even-age regeneration units that have been planted and contain planted trees that are now five years old or five feet tall would throw off the entire cutting cycle and projected yield that is required by the BOF rules in reference to maximum sustained production of high quality timber products, while considering the other forest values as required in the legislation. The THP applicant has noted the maximum sustained production requirement in the section on the "Timing of Project" alternative, as well as noting the loss of tree health and loss to mortality that could occur by delaying the project.

Similarly, the "No Project" alternative also points out the negative environmental impacts of increased risk of wildfire and loss of habitat diversity, as well as the negative impacts of not achieving the legislative goal of maximum sustained production of high quality timber products.

With respect to the concern stated above regarding the "Conclusion to Alternatives", the comment is made that the TPZ zoning does not require even-age management as the only choice to be made and that the analysis in the THP is therefore not correct. However, upon reading the analysis in the THP, the proponent does not state that the TPZ zoning was the reason that the preferred alternative chosen was Alternative #1, i.e., the present project as proposed in the THP. The applicant states that Alternative #1 is the only one that includes both the goals and objectives of the landowner (for example, those goals as stated in the approved Option "a" plan for SPI in the Southern Forest District) and which also complies with the TPZ zoning.

With respect to the notation in the concern above about the statements made on THP page 56 regarding the loss of three vertebrate species lost from Sierra fauna in historic times, the THP applicant has referenced this statement from the scientific literature. This is therefore not an original statement from the plan applicant. To require that the statement be expanded to include other species that are not "lost" but are "in decline" is to read more into the statement than was intended by the author of the statement that was made in the literature cited.

In summary, in the absence of any BOF regulation that can be used to guide plan review

and given the myriad of court cases that have addressed the sufficiency of the information found in alternatives as used in Environmental Impact Reports, CAL FIRE finds that the discussion of alternatives found in this particular THP is fairly typical of discussions in other approved THPs where there was a finding in the plan of no significant adverse environmental impacts. A further ruling about the sufficiency of the information in the THP in relation to the CEQA requirements would likely require a legal conclusion and are therefore not further discussed in this Official Response.

2. **Concern:** There was a concern that this THP attempts to show some scientific justification for SPI leaving so little in terms of snags within its even-age units. On pages 98 and 99 of the document, the authors contend the wild claim that SPI has determined the number of snags in each diameter class needed to provide maximum (100%) habitat capability for the primary cavity using species in "our timberland." This beginning basic step is totally arbitrary and is not based on clear scientific standards utilized by the U.S. Forest Service on their directly adjacent lands. Forest Service minimum standards are for at least four of the largest snags per acre to be left on the project site, plus in most cases all oak snags are directed to be left as well. SPI purports on page 99 of this THP that 0.05 snags per acre of 24" dbh will meet the maximum habitat capability for the biological assessment area. This is so false it defies logic. That would mean that one large snag per 20 acres would meet 100% of the habitat capability for white headed woodpeckers, pileated woodpeckers, sawhet owls, flammulated owls, pygmy owls, CA spotted owls, flying squirrels, gray squirrels, chickaree squirrels, and many other species that rely upon large snags in the forest. Where present, the Forest Service's minimum snag retention standards aim to retain at least four such snags per acre – 80 times the "maximum capability" level claimed by SPI's calculations.

   Even worse, on top of the completely inadequate 0.05 large snag/acre standard, this THP then contends that SPI uses a 50% maximum habitat capability objective, so SPI sets an objective of only retaining 0.02 snags of 24" dbh per acre, which would be one snag per 50 acres.

   The Director and the State Department of Fish and Game cannot possibly swallow this completely bogus claim. At a minimum, SPI should be required to retain an average of at least one large snag (24" dbh or larger) and one smaller snag (>15" dbh) per acre (averaged across the project's even-age acreage). CSERC strongly advocates for this THP to have such a clear requirement mandated prior to any approval.

   Snags will also be unreasonably cut down to purportedly reduce risk to those driving on project roads, when the conditions are incorrectly drafted and objectives are invalid. On page 20 of the THP, the document acknowledges that "snags over 20 feet in height" "shall be felled for hazard reduction within 100 feet of all public roads, permanent roads, seasonal roads, or landings." A snag 25' tall or 30' tall cannot fall over and pose a risk to a road 100' from the base of the tree.

Response: The last paragraph in the concern above does not consider all the hazards that could be present from retention of snags over 20' in height within 100' of roads. In addition to cars actually on the road, there is the risk to cars parked alongside the roadway, perhaps on a turnout or on a landing; the risk of someone parking alongside the road and walking a short way into the forest; and the risk expressed in the rules of the BOF to eliminate fire hazards within 100' of the edge of the surface of public roads.

With respect in general to snag retention, the Forest Practice rules and regulations in 14 CCR Section 959.1 state that "*within the logging area all snags shall be retained to provide wildlife habitat except as follows...*" The exceptions include safety and fire hazard considerations or situations where snags are merchantable. With respect to even-age regeneration methods, it is often difficult to retain snags when considering safety because site preparation equipment would be working in close proximity to infirm snags and for this reason, snags may be selected for removal in these areas. Crews that come in after site preparation to perform artificial regeneration activities are also adversely impacted by infirm snags and the regulations allow for consideration of this activity as well. Additionally, where slash burning or broadcast burning is conducted, snags can be considered a hazard due to the potential for spread of fire. Snags also pose a hazard where areas are planted to seedlings as the snags would be the tallest remaining structure in the area and would therefore be a natural target for lightning strikes and subsequent fires. Therefore, the disposal of snags within clearcuts and these other similar even-age regeneration systems would likely fall under the exceptions of the Forest Practice rules and would not constitute a violation of the law. There is not such a hazard with respect to the general public from the snags, but the hazard is described as above. There is certainly a consideration of liability if CAL FIRE or another agency required retention of snags in these areas in the absence of clear and enforceable snag retention standards in the Forest Practice regulations. With respect to managed private industrial timberlands as a whole, there is a low level of mortality that is normal for these lands and therefore, snags are not as common in these areas as they might otherwise be in the general forest areas. The BOF has assembled numerous tools that are available for the timberland manager to use to keep mortality at a low level including the use of Exemptions to Timber Harvesting Plans and Emergency Notices in recognition of the legislative goals in the Forest Practice Act to provide for maximum production of high quality timber products. Trees are often harvested on these private timberlands as they decline in health and before they become dead snags and/or have the opportunity to spread insect of disease problems to the surrounding areas or ownership's. An analysis of the watershed area or biological area as a whole is needed, therefore, to insure that enough snags and LWDs are present in unmanaged or publicly owned areas for wildlife needs.

Where even-age regeneration methods are being used, it is proper to analyze the snag and LWD retention in a larger area than just the logging area itself as it is likely that safety considerations are going to allow for removal of many snags within the logging area. In fact, Technical Addendum #2 of the BOF regulations state that the THP should consider the "*...biological habitat condition of the THP and immediate surrounding area*" with respect to snags/den trees, multistoried canopy and LWD. While there is no

definition of "immediate surrounding area", CAL FIRE would take this to mean the area of the biological assessment wherein animals and birds, including raptors, who typically use snags are mobile enough to utilize snags that occur some distance away and mammals who are mobile on the ground could use LWD for habitat.

CAL FIRE has found in the approval of the THP that the biological assessment area has a component of USFS lands where there is likely to be a higher level of snag and LWD retention. USFS lands have generally been managed in a way that has resulted in excessive numbers of snags and LWD. While it is likely that fire hazard reduction type logging will be done on USFS lands, it is not likely that such logging will cover even a fraction of the assessment area. While it is admirable that the USFS purportedly retains a higher level of snags on their lands, it must be noted that the goals of the public agency do not include the legislative intent for "maximum sustained production of high quality timber products, while giving consideration ...." that applies to private industrial timberland owners in California. The THP states that the amount of LWD is high over the assessment area and that snag densities exceed the standards set by SPI. The rules of the BOF do not provide exact standards or numbers per acre of snag or LWD retention levels. SPI has cited scientific literature references to support their policy of retaining a 50% level of snag retention. The literature states that leaving less than 40% of total habitat capability could present an unacceptable risk to cavity using wildlife species. SPI apparently chose the 50% level because it is higher than the critical level, but could still likely comply with the Forest Practice Act requirements with respect to maximum sustained production.

Given the extent of local knowledge of the area of the plan, there is no substantial data indicating that there will be a significant adverse impact to non-listed wildlife species as a result of the treatment of snags and LWD as proposed in the plan and as specified in the Forest Practice regulations. CAL FIRE finds that the information provided in the THP provided the information necessary for CAL FIRE to make a determination concerning the potential environmental impacts of the project. CAL FIRE further finds that the plan as proposed and approved is in compliance with the regulations and intent of the BOF and other associated rules.

3. **Concern:** The THP acknowledges the value of oaks for a wide diversity of species, yet the THP fails to provide adequate mitigation for the projects extensive impacts to oaks. Even the inadequate mitigation measures suggested in the THP are neither mandated not strong enough to compensate for the cutting and bulldozing of oaks that result in so much loss of food, shelter, and shade for wildlife. On pages 20 and 21 of the document, the text makes it clear that oaks are a major component of the stand structure and "efforts shall be made to protect these oaks". Those efforts however, when spelled out, rely primarily upon oaks being left in retention areas in the even-age cut units. Those retention areas, however, make up no more than 5% of any even-age cut unit and may actually make up as little as 1 % of a clearcut unit. The limited oaks left in 1 % to 5% of the site means that oaks will be stripped from

95% to 99% of a clearcut unit except for perhaps two to three oaks that might be left in each regeneration unit. This mandated "oak protection" condition means that at a minimum, in a unit where no large oaks are left in the wildlife retention units, there could be as few as two oaks left per 20 acres on average. Leaving one large oak, or even two large oaks, per 10 acres provides extremely low wildlife value compared to the fact that @22% of the project site's basal area occurs in oaks. Given the high value of oaks for deer, migratory songbirds, fishers, cavity nesters, and a host of other species, the Director should not allow SPI to gain approval for a THP with such inadequate retention of oaks. On page 85 of the document, the text provides the conclusion that the project will not have a significant adverse impact on Mule Deer (and subspecies Black-tailed Deer) because the mitigations and retention of oaks in even-aged units along with protections in the WLPZ will prevent an adverse effect. This assertion is invalid and is unsupported by the mitigation measures prescribed in this document. There is no assurance that even a single mature oak will be retained in the "Retention Areas," since no language requires any specific component to be made up of oaks. Second, as noted above, there is no assurance that Retention Areas will make up any more than 1% of the cut unit acres, meaning that up to 99% of the unit could have zero oaks. Third, the sparing of two to three oaks per even-age unit is completely inadequate to mitigate for cutting roughly 100 acres of oaks across the even-age unit. On page 99 of the document, the THP acknowledges that an average of 26 sq ft of basal area of oaks per acre exists over the entire plan area. Oaks are a critical resource for wildlife and for the forest ecosystem, yet clearcutting or alternative prescriptions across SPI lands in Calaveras and Tuolumne County have resulted in the majority of oaks being cut, bulldozed, sprayed with herbicides, or otherwise damaged or killed by operations. Our staff has visited countless SPI treatment units in the local region, and the overwhelming majority of oaks have been intentionally removed in almost all units. Only where foresters have carefully designated individual trees or clumps of oaks/alders/maples for retention are hardwoods retained. Then, subsequent to logging and site prep deep tilling or bulldozing, many project sites have the oaks, dogwoods, or other hardwoods killed by herbicide applications. Thus, without clear, enforceable requirements for oaks to be retained and protected in harvest units, the amount of oaks that survive logging, site prep, and spray treatments ends up being a tiny percentage of the original number of oaks on the site. Since the THP is supposed to be responsive to a CEQA-equivalent analysis of environmental impacts and potential mitigation measures to reduce the significance of impacts, the Director must ensure that oaks are adequately protected and retained to provide for wildlife and ecosystem needs. As we have noted over and over in the past, the State has a goal in this district to retain and protect 400 square feet of basal area of oak per 40 acres (an average of 10 sq ft of basal area of oak per acre), yet this THP provides absolutely no assurance of specific measures that will come close to meeting that goal. The THP does not provide any clear requirement that SPI will meet the state standard objective of 10 square feet of basal area of oak per acre to be retained on average per each 40 acres. This does not provide any assurance that the oak value for wildlife will be protected as would be required in any other CEQA or CEQA-equivalent decision-making process.

Response: In order to "require" protection of all oaks, CAL FIRE has to look at the regulations of the Board of Forestry and Fire Protection for regulatory authority. The rules of the Southern Forest District have language regarding retention of oaks where the preharvest timber stand contains 400 sq. ft. of basal area of oaks per 40 acres. The legislative history of the "oak" rule goes back to the beginning of rule language for the Southern Forest District shortly after the passage of the Forest Practice Act of 1973. Oaks were found by the public committee known as the Southern Forest District Technical Advisory Committee (SFDTAC), to have an important consideration for wildlife, especially for forage production to provide nutrition to deer to aid in the success of fawning. The legislative history does not indicate that there was intent by the SFDTAC that retention of 400 sq. feet of oaks per 40 acres was a goal to be reached or that somehow 10 sq. ft of basal area was the exact number required for deer forage. The recollection from Norman Cook, RPF #514, who was the past Acting Executive Officer of the SFDTAC from 1979 until it's disbanding in approximately 1989, is that the SFDTAC and later the BOF, discussed that oaks were important to deer where oaks historically existed at or above these levels and that deer populations were built and dependent on the forage provided from oaks where they existed at or greater than the level of 400 sq. ft of BA per 40 acres.

With respect to this particular THP, oak levels in the pre-harvest condition are found to be abundant. However, the enforcement language in 14 CCR Sec. 959.15(a) is absent as the regulation contains the voluntary language "should be retained". The THP proponent has made a statement on page 99 of the THP to try to comply with this voluntary regulation and has noted the existence of the standards of 14 CCR Sec. 959.15(a). It should be noted that, especially where even-age regeneration methods are being used, it is difficult to retain oaks due to the need for mechanical site preparation and replanting of seedlings. Oaks retained in large amounts would shade the ground and use water and soil resources so that it might be difficult in insure that 300 conifer seedlings per acre would survive following planting. For that reason and others, the oak regulation was designed with a "*should be retained*" wording in 14 CCR Sec. 959.15(a) and does not therefore constitute an enforceable standard. The standards of retention for oak are stated in the THP on pages 21-22 and oaks will be retained wherever possible in Wildlife Retention Areas within even-age regeneration units, in Selection areas and within WLPZ areas. In addition to these areas the THP states on pg. 22 that: "if present a minimum of 2 to 3 oaks (preferably greater than 25" dbh) shall be left in each regeneration unit". With respect to the issue of cumulative adverse impacts to oak resources, in the entire biological assessment area, there are significant areas of public lands where the retention of oaks would be expected to be highest.

4. **Concern:** Despite many pages of text related to watershed and water quality issues, the discussion in the document fails to provide accurate evaluations of the projects potential impact on watershed values, water quality, or aquatic species. On pages 70- 80, SPI claims that the project will not cause any significant adverse effects for

watershed or water resources. This is illogical and not supported by the record. First, page 71 acknowledges that SPI owns 4,617 acres of the watershed (55%). On pages 68 - 69, SPI acknowledges that 3,285 acres were logged within the Lower Blue Creek Planning Watershed over the last decade, and that approximately 1,800 acres of even-age logging treatments were done. That means that out of the 8,320 acres in the planning watershed, almost 22% of those acres were stripped bare by even-age treatments in the last decade, and another 1,400 acres were disturbed by other logging methods. Thus, roughly 40% of the planning watershed was disturbed in just the last decade, yet SPI now proposes to use even-age clearcut type treatments across another 400 acres. On page 71, the THP acknowledges that moderate amounts of bank cutting, severe scouring, and bank mass wasting is occurring in the adjacent upstream watershed. On page 72, the document admits that the majority of Class II watercourses in the area show signs of downcutting, recent incision, exposed raw banks and signs of lateral erosion. Debris jams are also a major issue. On page 76 of the document, the THP states that of the 26 planning watersheds in the Upper Mokelumne which have SPI ownership, 13 of those watersheds had a numeric ranking of C and D, meaning that they are moderately susceptible or highly susceptible to disturbances. With all of this information, there is no logic to the conclusion on page 77 that alleges "any potential significant adverse impacts will be reduced or prevented from potentially contributing to a "cumulative effect" due to the mitigation measures of the project. CSERC asks the Director and the State Fish and Game specialist to consider the logic and validity of such a claim. Many of the streams in the project area already suffer from past degradation exacerbated by logging, logging roads, skid trails, and the loss of vegetation that would hold the soil. The loss of forest litter, the loss of the forest canopy, and the tilling or bulldozing of even-age units all contributes to watershed degradation. Now the lumber company proposes to clear @400 acres of even-age units, to apply herbicides where desired to kill off vegetation, and to manage the resulting tree farms as high productivity plantations. The overall amount of new bare soil, combined with still mostly bare soil across 1,800 acres of previously clearcut sites within the planning watershed will obviously create a significant impact to watershed values, water quality, and aquatic species. CSERC urges that the Director require SPI to delay any new even-age treatments in the watershed until such time that no more than 10% of the watershed has been treated with clearcut-type even-age treatments in the prior decade and that streams in the planning watershed have recovered to the point that evaluation of current conditions reveals no further bank cutting and incision, reduced scouring and bank mast wasting, and reduced signs of lateral erosion. Tied to the problems in the watershed, this project proposes to allow ground-based equipment on slopes from 50% to 65% with Moderate HER, and on slopes over 50% which lead without flattening. This use of ground-based on such steep slopes further increases the likelihood for erosion to wash off steep slopes during major storm event, contaminating streams and degrading aquatic habitat. Roads will be constructed and at least 14 road segments are shown for road reconstruction. Whether or not there are WLPZ restrictions or equipment buffers as described on pages 13 and 14, the stripping of all trees on the slopes, the treatment by logging equipment, and the subsequent killing of vegetation

by herbicides all degrades the natural filter system of the healthy forest. SPI should not be given state approval to engage in actions that pose such a significant risk to water resources.

Response: THP 4-08-005/CAL-1 contains provisions for reconstruction of about 14 temporary roads to access the clearcut units. The types of road being constructed are temporary in nature and will be subject to abandonment as required by the rules following the completion of logging. Road reconstruction amounts to improving the condition of roads so any movement of sediment would be less likely to get into a watercourse. The WLPZs of the Class I and Class II watercourses will have some harvesting, but this is mostly in the form of selection logging. Tree retention within these areas should be adequate and in compliance with the minimums stated in the rules of the BOF. Any additional requirement for increased levels of overstory/understory would likely require a regulatory change where there is not finding of a significant adverse environmental impact. The THP contains a list of improvements to road drainage.

In the absence of the submittal and approval of this THP project, the existing roads within the project area would not be under any regulatory system that would require continuing road maintenance. The very fact of the approval of the THP will require maintenance of these graded dirt and gravel roads to be accomplished during the life of the plan and for at least one year beyond the submittal of a work completion report. Due to plan extensions that are common for SPI, this would mean an approximate period of road maintenance of up to six years time.

The concern as stated above implies that 22% of the watershed assessment area contains "bare soil" from past logging. One past project (listed as THP 04-00-085/CAL) in the THP was never harvested and withdrawn, so there is the potential to count acres twice. However, the most recent past project was submitted to CAL FIRE seven and a half years ago and the remainder of the projects submitted in the assessment area are as much as twelve years old. These even-age regeneration areas have been largely replanted and do not contain "bare soil". Additionally, even freshly logged even-age regeneration areas do not contain 100% bare soil as litter, organics, roots, slash and even rocks cover a high percentage of the soil surface
With respect to watershed resources, CAL FIRE has been monitoring the condition of the North Fork of the Mokelumne, the Middle Fork of the Mokelumne and the South Fork of the Mokelumne for many years going back to the initiation of the 1973 Z'berg-Nejedly Forest Practice Act. A number of studies have been done in the past and some of this information gathered about the condition of these watersheds follows.

General Conditions of the Middle Fork Mokelumne River. Ray Albright, PhD, assessed the condition of the Forest Creek watershed in 1991. Forest Creek is a tributary of the Middle Fork Mokelumne River. Albright's findings for Forest Creek were as follows:

- The data shows that Forest Creek's conditions as 51% good, 31% fair, and 18% poor (Albright, p.6).
- Sensitive stream segments account for 25% of Forest Creek with all of the segments occurring in the upper half of the watershed (Albright, p.6).
- In 1958, Forest Creek wildfire occurred in the mid-section of the watershed. The fire cleared everything on the hillslopes from the stream to the ridgeline. This exposed a large tract of soils with high and very high erosion hazard and some Iron Mountain soils (Albright, p.16).
- The data suggests that the overall health of Forest Creek watershed is somewhere between fair and good. A majority of the channel segments surveyed in the Forest Creek watershed proved to be in a good stable condition with few signs of adverse impacts (Albright, p.19).
- The evidence indicates that the stream degradation was caused by the fire (Albright, p.20).
- Water quality tests across the watershed revealed normal levels of pH, hardness, alkalinity and dissolved oxygen. The values varied only slightly between sensitive and stable segments. Water temperatures warmed in the degraded segments and cooled in the downstream shaded segments (Albright, p.23).

There was a detailed survey of fishery conditions in Forest Creek, (THP 4-91-81, Appendix J and Christophel, 1992) prepared by Beak Consultants in December 1992. In this study, ratings of good, fair, and poor were given to different channel segments. Statistical comparisons using the Kruskal-Wallis test showed no significant difference among the estimated populations of all trout (brown and rainbow trout combined) associated with the three channel stability conditions (Christophel, p.12). The report showed those fish population data from the current study also compare favorably with the results of surveys of other trout streams in California. Average total trout biomass estimates for each reach surveyed in Forest Creek were generally higher than those reported for other west slope Sierra Nevada trout streams (Christophel, p.23). The report concluded that fisheries conditions are suitable in Forest Creek, inferred by successful reproduction and presence of multiple age classes of trout (Christophel, p.23).

While not directly comparable with the report by Beak Consultants on the Fish Community Survey, CAL FIRE also considered the findings in the A. A. Rich and Associates report on Salmonid Habitat Conditions and Population Estimates in Forest Creek and the Middle Fork of the Mokelumne River, California (Rich, 1991). The two reports are not directly comparable because Rich's study design was restricted to sampling trout populations within a single habitat type (thalweg pools) while the Beak Consultants study sampled 300-foot sections encompassing several habitat types (Christophel, p.22).

Findings in the Rich report, sampling thalweg pools only, compared conditions in three stream reaches of Forest Creek with a "control" reach of the lower Middle Fork of the Mokelumne River. Presumably, this control reach was chosen because it had not been logged since 1983 when it received only a light selection harvest. The report, however, also states that there is no real control stream, as the entire Mokelumne watershed had been logged (Rich, p.15). This fact can be confirmed by CAL FIRE records in the Fresno headquarters indicating a logging history for the Mokelumne for at least the past 25 years. These records show numerous THPs filed within five years before the date the research was done for the Rich report.

From all indications, it is highly likely that the conclusions cited in the report relating to the better health of the fish in the control reach is blemished by the fact that the control reach actually has a logging history similar to that of the other reaches of both the Middle Fork and Forest Creek.

The Rich report was critical of the condition of the spawning habitat in both creeks, but did conclude that the trout were in good condition with mean condition factors above 1.0, a value considered to represent healthy salmonid. Mean biomass estimates were variable and the sites were not statistically different from one another (Rich, p.47).

General Conditions of the South Fork Mokelumne River. Ray Albright, PhD, conducted a stream survey of the Licking Fork of the South Fork of the Mokelumne River. Licking Fork is typical of Mokelumne River forested watersheds in the mixed conifer zone and has a land ownership heavy to private industrial timberlands. The Albright report for Licking Fork of the South Fork of the Mokelumne River, specifically indicated:

- Streamflow behavior would be similar to that observed on nearby Forest Creek where it was noted that annual discharge volumes were roughly 40-50% of the precipitation volume during the years when precipitation exceeded 30 inches (Albright, p.4).
- The data shows that 86% of Licking fork stream channel was in a good stability condition and 14% was in a fair condition (Albright, P.8).
- Livestock trampling of stream banks and small woody debris jams in L32 contributed to its high BAT. Placer mining for gold in L52 had flushed sizable amounts of sediment from the sideslopes into the stream (Albright, P.15).
- The results of the water quality testing are in Table 5 and the associated locations are shown on Map 1. Although tested for, no ammonium or nitrate was detected at any of the sample sites (Albright, P.28).
- Licking Fork watershed was found to be in a generally healthy condition with a few localized sources of adverse effects (Albright, P.37).

A "Stream Channel Analysis" by Ray Albright, PhD, documents the stream survey of the Mid-Section of the South Fork of the Mokelumne River. CAL FIRE considered the information in the Albright study of Swamp Creek to learn about the condition of that watercourse following years of logging. Both Licking Fork and Swamp Creek eventually

drain into EBMUD's reservoirs and are therefore appropriate to consider:

- The stability condition of Swamp Creek was found to have 87% of the channel in good condition, 10% in fair condition, and 2% in poor condition. The poor condition reflects a single sensitive segment (Albright, p.24).
- Overall, Swamp Creek watershed has a stable channel that is effectively functioning as a transport mechanism for water, sediment and woody material. Sediment fluctuations (gains, losses) on the upper bench are having no adverse effects on the downstream conditions. Water quality and temperature records confirm that no degradation is occurring to the water quality parameters in the water column. The aquatic community is robust and productive with a wide array of habitat units and suitable habitat conditions (Albright, p.50).

The Albright report for the Mid-Section of the South Fork of the Mokelumne River, also indicated:

- The data showed that 100% of the South Fork Mokelumne river channel, within the study watershed, was in a good stability condition. A good stable condition denotes that the three channel components are in a sound, relatively undamaged state with few signs of adverse effects (Albright, P.18).
- The relative abundance of woods riparian species was very robust with good and excellent ratings (Albright, P.23).
- Overall, the existing road network within the study watershed was generating a low amount of sediment into the drainage system. Point sources, previously discussed, were observed but were not very common (Albright, P.48).
- Overall, this section of the South Fork Mokelumne is healthy and sound. The fact that water quality parameter showed no changes from above and below the sub-basins' inlets denotes that no adverse chemical changes are occurring (Albright, P.54).

General Conditions of the N. Fork Mokelumne River. Ray Albright, PhD, also conducted a stream survey of West Panther Creek for GP in 1992. West Panther Creek and West Panther Creek Watershed are north of Swamp Creek and are on the North Fork rather than the South Fork of the Mokelumne River. Albright found that this watershed was generally in good health. Conditions in some localized tributaries were less stable than the main channel. Low instream sediments were found in the main channel. Several historic road crossings serve as sediment point sources, and as candidates for remedial work.

The Albright report for West Panther Creek provides CAL FIRE with information on the timber harvesting effects over many years on an area with a similar logging history and environmental setting to Swamp Creek. The report specifically indicated:

- Overall, the water quality parameters were within the tolerance levels of most aquatic organisms. The high pH readings were near the upper limits for fish, however, the dissolved oxygen readings were optimal (Albright, p.38).
- Most of the poor crossings were contributing sediment into the channel from old fill banks (Albright, p.41).

- Overall, the existing road network . . . was generating a low to moderate amount of sediment into the drainage system (Albright, p.41).
- Past disturbances and current channel influences have not adversely affected the stability of the watershed. The lack of any poor segments and the large number of good segments demonstrates the watershed's sound health (Albright, p.43).
- The main factor determined to be threatening the stability of the main channel was mass movement and, to a lesser degree, both debris jamming and instream sediment. The number of debris jams capable of causing channel instability was relatively low (Albright, p.43).
- Tributaries were found to be in a slightly less stable condition than the main channel (Albright, p.44). A certain amount of instability can be expected as compared to the main channel. Tributaries serve as "feeders" and not as main water conduits, and as storage areas for sediments (Albright, p.45).
- Instream sediment in the main channel was relatively low despite the wide distribution of soils with high erosion hazard potential, previous mass movement activities and other channel disturbances (Albright, p.46).
- Water quality readings were within the tolerance limits of most aquatic organisms and did not appear to reduce the fish population.

Spittler, DMG Senior Engineering Geologist visited West Panther Creek Watershed and reported:

- Timber harvesting conducted prior to the implementation of the Forest Practice Act included in-stream road and skid trail construction, stream diversions, and construction of roads and trails across moderately steep slopes without installation of erosion control structures. Although the degree of acceleration of erosion control and corresponding increase in sediment yield from the property have moderated, mitigations of existing adverse conditions will occur from activities on the site that are conducted to Forest Practice Act specifications (Spittler, p.4).
- The Mokelumne River is a cold water stream that formerly supported an anadromous fishery. Comanche and Pardee reservoirs block migration of salmonids into the watershed. This significant impact will not be affected by proposed timber harvest operations (Spittler, p.8).
- Although the yield of sediment from the bed and banks of the watercourses on site are far greater than they were prior to in-stream road construction that occurred during harvesting in 1960, riparian vegetation is developing and the channels are stabilizing. . . .. The damage from early episodes of logging will continue to affect the yield of sediment in the watershed for the greater part of a millennium . . . will continue to affect down stream beneficial uses for hundreds of years (Spittler, p.8).
- Most of the material eroded from roads and skid trails will be captured by existing vegetation on site and not transported to watercourse channels (Spittler, p.8).

From Cafferata (2001)..... One source of information is Euphrat's (1992) dissertation project completed in the Middle Fork of the Mokelumne River watershed. He reported that

approximately 250 acre-feet of fine sediment was documented in Shaad's reservoir by the Calaveras Public Utility District (Duonsignore, N., 1991. Personal communication to Euphrat, cited in Euphrat 1002). Additionally, Euphrat found 30 acre-feet of sediment in the delta on the upstream end of the reservoir in about 1990. He calculated the average rate of basin erosion trapped in the reservoir over a 50-year period as 0.20 ac-ft/mi^2/yr (the drainage area above the reservoir is 28.3 square miles). Therefore, utilizing Euphrat's work, the total average amount of sediment contributed per year to Shaads Reservoir can be estimated at 5.6 acre-feet. Euphrat estimated that approximately 6.2% of the capacity of the reservoir has been lost due to sedimentation in 50 years."

Other parts of the Euphrat (1992) dissertations provide valuable information for the Middle Fork Mokelumne River watershed. He stated that no significant erosion was found to leave timber harvest areas during the period he studied the Middle Fork Mokelumne River watershed. Euphrat also estimated annual erosion for the Middle Fork as follows: road surfaces (39%), old fill wedges (19%), ORV and domestic road use (16%), natural rate (11%), range cattle in timber harvest area stream channels (8%), farming (3%), mainstem widening (3%), channel activities, non-timber harvest areas (1%), and subdivision (<1%). Euphrat concluded that much of the past erosion in the upper Middle Fork did not derive from BMP-controlled systems, and shows the cumulative impact on the sediment system of accidents and past practices. Erosion rates for the upper Middle Fork, calculated via a sediment budget for Schaad's reservoir, are mid-range for Sierran watersheds, and about 25% greater than for Pardee reservoir.

Some mention of the nutrient work that Holloway and others (1998) have completed in the Mokelumne Watershed would benefit this section. They found that nitrogen-bearing rock in the lower watershed is a major source of stream water nitrate in the lower Mokelumne River watershed. Stream water nitrate in the upper Middle Fork River watershed was found to have a median value of 2.3 μmol/L, while tributary streams in the lower watershed generally had elevated nitrate concentrations with median values of 18 to 99 μmol/L. These lower streams lie in a geologic region dominated by metasedimentary and metavolcanic rocks (Holloway et al. 1998). Holloway et al (1998) estimated that greater than 90% of the nitrate originates from the lower watershed that contains geological nitrogen (the upper watershed has 90% of the watershed area and a nitrogen flux of 0.12 kg N/ha/yr; the lower watershed has 10% of the area and nitrogen fluxes of 10-20 kg N/ha/yr. Therefore, we can conclude that nitrate levels from the timber management zone are low."

Also noted in the literature is the study of the South Fork Tule River (Marvin 1996), which has undergone a continuous increase in land-cover changes in three general spurts, all primarily within the timber zone: 1950, pre-1966, and pre-1972. These changes include logging 140 million bd. Ft. in 46% of the conifer forest, a doubling of roaded areas, and extensive conversion of dense oak woodland to grassland. Records began in 1961. The active management that occurred in the Tule River watershed was not correlated to an increase in flows with a five-year occurrence. Again from Cafferata (2001), "The citation of Marvin's (1996) research paper on the South Fork of the Tule River watershed is appropriate and provides sound data regarding the magnitude of the potential peak flow effects associated with timber harvesting in the Sierra Nevada Mountains."

The Foster Wheeler Assessment of the watershed-wide inventory of the Upper Mokelumne River watershed is also part of the literature of this area of the central Sierra Nevada and is referenced in the current THP. The study was conducted in 1999 and 2000 on an area covering 578 square miles. The results of the assessment indicated that the water quality in the Upper Mokelumne River is excellent, primarily due to the limited development that has occurred in the watershed. Quantitative ratings of stream reaches within state-planning watersheds within the Mokelumne before the January 1997 storm indicated that 2% of the stream reaches were characterized as "excellent", while 75% were characterized as "good", 18% as "fair", and only 5% were "poor". More specific to the 26 planning watersheds in the Upper Mokelumne that have SPI ownership areas, the report gave 6 and "A" ranking, 7 had a "B" ranking, 7 had a "C" ranking and 6 had a "D" ranking. This ranking is not regionally adjusted and cannot be compared to similar rankings in other geographic areas within the State. As an example, previous findings have shown that for total erosion potential, the Sierra Nevada ranks low, while the Klamath province ranks moderate and the north Coast ranks high. Therefore a "D" ranking in the Sierras may be equivalent to a "C" rank in the Klamath and a "B" rank in the north Coast. In conclusion, the report provided that the overall health, stability, and condition of the Upper Mokelumne River watershed are good.

Also referenced in a recently reviewed was a study done for PG&E during their FERC re-licensing of the Salt Springs Reservoir which was done in May 2001. This project is also within the N. Fork of the Mokelumne River. Numerous water quality samples were taken from the stream which indicated that the water quality was very good and all samples meet or exceeded the California domestic water standards and EPA primary and secondary drinking water standards. The study also looked at fish populations and found an average of 27.2 to 45.8 pounds of rainbow trout per acre. The THP examines the condition of the N. Fork of the Mokelumne River on page 72 of the cumulative impacts assessment. The condition of the river is found to be good and in stable condition. The canopy closure is in the range of 80-100%, except for a few small areas were there are non-commercial timberlands bordering the channel.

In addition to examining the record of past activities that are part of the public record within the Mokelumne River drainage, CAL FIRE has continuously examined watercourse segments as each and every THP has been submitted, harvested and completed in order to determine the health and maintenance of water quality within the entire drainage and elsewhere in the central Sierra Nevada. The public record of each and every THP shows the care taken by CAL FIRE employees to determine that the quality and beneficial uses of water are protected from sediment, slash and debris. Timber harvest plans are inspected numerous times before, during and after harvest by employees of CAL FIRE. To date, the CAL FIRE forest practice inspectors have not found significant adverse cumulative or direct environmental impacts to the public trust resources in the Mokelumne River drainage as a result of the timber harvests conducted by the primary industrial forest landowner.

CAL FIRE does not find in the record of this plan, or in consideration of past similar projects of this type, evidence that the watershed resource values would be likely to undergo

significant adverse environmental impacts as a result of this THP nor would there likely be any adverse impacts to the quality or beneficial uses of water.

5. **Concern:** It was stated that the document admits that three recorded CA spotted owl nest sight and sightings are recorded on land adjacent to clearcut units or within 1/4 mile of a unit. No protocol-consistent surveys have been done within the project units prior to the development of this THP. SPI cannot affirm or deny that CA spotted owl individuals or pairs may be presently using habitat within units proposed to be cut. They have not done the surveys. They assure that the SPI biologist will "evaluate" areas to ascertain if areas contain suitable habitat to warrant surveys. Even if such surveys are done, they do not prove absence ... only a failure to detect presence. Since CA spotted owl utilizes a wide range of conifer stands with canopy levels of 40% or greater, the very act of doing the project will transform the project acres into unsuitable habitat. Likewise, for the northern goshawk, there are three known northern goshawk NDDB sightings within one mile of the project boundaries. No protocol-consistent surveys were done for goshawk, nor can such surveys prove absence. But protocol consistent surveys could at least provide the Director and State Fish and Game representatives that, after surveys, no detections would indicate lower risk of nesting pairs or territories being degraded or destroyed. Without surveys, there can be no way for the Director to know if the project site is occupied by nesting pairs of goshawks or other individual birds. Overall, the THP cannot stand as a CEQA-consistent document if there has not been credible surveys for Special Status or known at-risk wildlife species that will lose a huge amount of habitat if the project goes forward. Both northern goshawk and CA spotted owl depend heavily upon dense forest habitat with adequate cover. This project will open up significantly or totally denude 400 acres of such habitat. The Director should reject this THP until such time that SPI completes surveys of all suitable habitat, agrees to mitigations that will retain pockets of large trees and suitable canopy cover for both the spotted owl and the goshawk.

Response: RPFs and their designees typically have had training in recognizing wildlife species that occur within a forested environment and are, at the very least, familiar with the locations of the THP that they prepared and in all likelihood did most of the ground preparation of the plan and have walked all of the area and made observations with respect to wildlife living in the area. The Forest Practice regulations contain strict requirements for surveys of Northern Spotted Owl (NSO) in 14 CCR Sec. 939.9 and a requirement that a "*state employed biologist designated by DFG*" be used to perform the survey for this species. It can be inferred from the BOF requirements for a state employed biologist to be involved in NSO surveys in the absence of any like requirements for surveys of other wildlife species, which the BOF must have intended to allow non-specialists to do the surveys for other forest species. As such, the regulations do not have any specific requirement or qualification for the type of person to be designated to perform surveys for California spotted owl or northern goshawk or any number of other wildlife species other than that the person who prepares a THP must be an RPF or be supervised by an RPF. The plan demonstrates the scoping method used to determine which species would be likely to occur

within or adjacent to the project area. It is noted that the plan applicant employs a wildlife biologist on staff and that the biologist will likely be involved in some of the survey work in preparation of the plan as is stated in the THP.

Additionally, a PHI was required for the plan and a CAL FIRE forester familiar with wildlife in the area has also been on the ground making observations. In the case of a plan such as this one, numerous other harvest plans have been submitted in the same relative area or elsewhere in the assessment area so that the wildlife species that may be present are pretty well known at the time of THP submission. There is not a great deal of "mystery" or facts that are completely unknown as there might be if the plan was being submitted in an area that was largely wilderness in nature. The plan utilizes data from the NDDB and adds data from the SPI wildlife database to "scope" out the wildlife species that might be likely to occur in the area. CAL FIRE added local knowledge of the surrounding area in reviewing the THP.

The plan specifies measures to be taken to further survey for the species during the active breeding period and the plan also contains measures that will be taken in the event that these species are found as a result of future surveys. Instructions from the CAL FIRE Director have indicated approval of two different methods of surveying for special status species. One method would suggest that surveys would be done in advance of the preparation and submittal of a THP. This method is particularly appropriate for relatively small plans where timber operations would be conducted almost immediately upon approval of the plan. Regarding the statement about any surveys failing to prove an absence of a species – only the failure to detect a presence -, the same can be said about almost any attempt to prove a negative.

Another method approved would be to conduct the survey at a time much closer to the actual conduct of timber operations, but to have the THP list the measures that would be taken in the event that listed species would be discovered. In the case of these SPI plans, it may take anywhere from one to three or even five years if an extension were granted before timber operations would be conducted in a particular area of the plan. Given the mobility of some species, including raptors which are known to use alternative nesting sites with frequency, it would appear to be logical for one to survey the area at a time closer to the actual conduct of timber operations in the particular area.

The plan contains statements that such surveys will be taken during appropriate survey seasons in advance of said timber operations and contains measures that will be taken to address protection of species habitat in the event that sensitive species are detected. There is no requirement in the Forest Practice regulations that a "certified biologist" be used to conduct surveys. The THP recognizes that a finding of listed species would require full consultation with DFG and notification to CAL FIRE would also be required so that a plan could be designed to provide habitat protection for the species. Non-listed species, including songbirds, are handled differently in the regulations. The Migratory Bird Treaty Act is in effect for nesting species of non-listed raptors and songbirds. The rules of the BOF require denial of a THP which does not meet the conditions of individual rules, and as such, 14 CCR Section 959.4 is the operative regulation for non-listed species. This regulation

states: "*Where significant adverse impacts to non-listed species are identified, the RPF and Director shall incorporate feasible practices to reduce impacts as described in 14 CCR 898.*" There has been no finding of significant adverse impacts to non-listed birds as a result of this harvesting taken in context with other closely related projects and therefore there is no ability to deny the THP or to make a case for additional mitigations or change the silvicultural methods that are proposed in the THP by the Plan Submitter.

With respect to the concern about removal of CSO habitat in the even-age regeneration units, the rules of the BOF require an evaluation of the habitat for on a biological assessment wide area for non-listed species. According to BOF Technical Rule Addendum No. 2, the biological assessment area can be reviewed for snag retention, LWD level, hardwood stocking levels, presence of multi-storied canopy, late seral and functional habitat for same. The Department has examined the conclusion by SPI that no substantial impact will likely occur to the California spotted owl within the biological assessment area. Upon review of the information contained within the record, CAL FIRE has also independently reached this same conclusion. Among the many factors considered was research that has found that a significant percentage of the known spotted owl nesting locations on federal land are found in small sawtimber (40%); that even-aged management at a 50 to 80 year rotation age will grow such sawtimber, as can be seen throughout the Sierra as a result of even-aged timberstands that were created as a result of fire or harvest by man and as demonstrated in the SPI Option "a" document; that despite 100 years of logging activity in watersheds owned by SPI, where even-age treatments have been practiced, there are owls present on private forest land at various locations; the principle that each successional stage of a Sierran mixed conifer forest provides for useful habitat elements; and that federal forest timberlands are being managed with far less disturbance from harvest than in past decades thereby tending to increase decadence and late seral or late successional characteristics.

SPI policy for protection of any large raptor if discovered during operations is presented on page 20 of the THP. Also this THP provides for walk thru surveys of all evenaged regeneration harvests units shortly before harvest of a unit, providing additional protection and opportunity to detect a raptor that has move into the plan area between approval and harvesting.

6. **Concern:** There was a concern that Fisher and American marten habitat is not given any protection, nor were appropriate furbearer surveys done to determine presence of such rare, Special Status mammals. The Squiggly project area has highly suitable habitat for fisher, due in part to its low elevation and low levels of snow, but also due to some relatively high quality habitat areas on nearby national forest or BLM lands in the surrounding area. All SPI THPs now contain generic text that purports to dismiss any risk to fishers from the aggressive logging treatments proposed in SPI THPs. If there is a single mammal that has the greatest potential to suffer from evenage logging treatments and conversion of habitat, the fisher is that animal. The THP claims that the fisher range is "widespread" and that Best Management Practices incorporate sufficient protection for snags and large woody debris that the fisher needs no mitigation measures to be protected. CSERC strongly disputes this

claim. The proposed project, along with adjacent past and current projects, significantly reduces connectivity as well as suitable habitat for any fishers that may be surviving within the project area. Without any scientific basis for assessing whether or not fishers or martens may be present or absent in the plan area, SPI has concluded that their evenage cut treatments will not harm the fisher (or apparently the similar, less threatened, but still at-risk marten). Habitat fragmentation is one of the main threats to fishers' and martens' biological requirements for connectivity as they move about their vast home ranges. The continuation of conversion of currently suitable fisher habitat into young tree plantations of unsuitable habitat is a significant threat to fisher and marten movement. It is also a cumulative impact to the steady loss of fisher and marten habitat on SPI lands within the plan area.

(Amended Concern from 10/15/08) The THP proposes to remove mature forest cover and to further open up adjacent brush fields or low stocked stands so as to further exacerbate the loss of canopy cover, shade, and adequate habitat for fisher. The THP makes many erroneous claims, some of which are taken from incorrect information attributed to the State DFG. The most outrageous statement alleges that there may be at least as many fishers in California now as there were estimated to be 80 years ago. The U.S. Fish and Wildlife Service, the U.S. Forest Service, and various universities have worked together on a Conservation Assessment for the Fisher, and personal communications with fisher biologists, as well as scientific assessment, totally contradict the claim that fishers may be at levels of 80 years ago. Earlier this year, researchers Gregory A. Green of Tetra Tech EC, Inc. along with Lori A. Campbell and Diane C. Macfarlane of the Pacific Southwest Region, USDA Forest Service, produced the most up-to-date, science-based conservation assessment of fishers in the Sierra Nevada, which was titled: A CONSERVATION ASSESSMENT FOR FISHERS CMARTES PENNANTD IN THE SIERRA NEVADA OF CALIFORNIA. In contrast to claims made in the THP, the following scientific information in the Conservation Assessment points out that fisher populations have been extirpated from significant portions of the Sierra Nevada region over recent decades. The following section begins on page 8 of the Conservation Assessment:

"Distribution: Fishers are found in forests and woodlands of North America, from the mountainous areas in the southern Yukon and Labrador provinces of Canada southward to central California, Wyoming, the Great Lakes and Appalachian regions, and New England (Nowak and Paradiso 1983). The Pacific subspecies (M. p. pacifica) was historically distributed throughout coniferous forest landscapes from British Columbia south to California. Currently, in California, M. p. pacifica occurs in the northern Coast Ranges and Klamath Province at elevations near sea level to about 1,700 m (5,600 ft) (Golightly et al. 2006) and occurs sympatrically with the marten in the southern Sierra Nevada (Stanislaus, Sierra, and Sequoia National Forests; Yosemite and Sequoia/Kings Canyon National Parks; and Giant Sequoia National Monument), at elevations of 1,500 to 2,130 m (4,900 to 7,000 ft) in mixed conifer forests (Zielinski et al.1997a), although they do occur alone to 1,000 m (3,280 ft; Golightly et al. 2006). Fishers historically occurred in the northern and

central Sierra Nevada (Lassen, Plumas, Tahoe, Lake Tahoe Basin, Eldorado National Forests) (Grinnell et al. 1937), but were not known to occur in the far eastern limits of the Sierra Nevada (Inyo or Humboldt-Toiyabe National Forests) or the Modoc Plateau (Grinnell et al. 1937; Figure 2)." "Over-trapping and habitat alteration have led to population declines and extirpation throughout much of their range in the Pacific states (Douglas and Strickland 1987; Zielinski et a1, 1995, 2005; Lewis and Stinson 1998), although predator and rodent control programs also played a role (Aubry and Lewis 2003, Wild and Roessler 2004). Fishers appear to be extirpated from central and northern Oregon and all of Washington (Aubry and Lewis 2003). From the 1960s to the 1980s, a series of reintroductions were attempted in Oregon, with mixed success, using fishers from British Columbia and Minnesota (Aubry and Lewis 2003). Extant populations of fishers in southern Oregon appear to persist in two distinct populations, one in the southern Cascades and one in the northern Siskiyou Mountains (Aubry and Lewis 2003, Aubry et al. 2004). Genetic analysis has demonstrated that the population in the southern Oregon Cascades was the likely result of reintroductions from British Columbia and Minnesota (Drew et al. 2003), while the Siskiyou Mountains population is the northern extension of the indigenous population centered in the Klamath province of California (Aubry et al. 2004, Wisely et a1. 2004). California fishers also have experienced a dramatic range contraction (Zielinski et al. 1995, 2005).

Although they historically occurred throughout the Sierra Nevada, the current distribution of fishers in California consists of two distinct populations separated by more than 400 kilometers (km): the combined coastal and inland population of northwestern California and the southern Sierra Nevada population (Zielinski et a1. 1995). Recent systematic surveys (Figure 3) indicate that fishers are absent from their former range in the central and northern Sierra Nevada, northward of Yosemite National Park to the southern Cascade Range (Zielinski et a1. 1995, 2005), and now occupy less than half their historical Sierra Nevada range. This gap in distribution effectively isolates the existing southern Sierra Nevada population from extant populations in northern California and southern Oregon. A regional monitoring program (Zielinski and Mori 2001) continues to monitor for the presence of fishers throughout the Sierra Nevada. Annual reports from 2002 to present are available through the Forest Service Regional Office or any Forest Service office in the Sierra Nevada." Within the Conservation Assessment, there are many points that refute erroneous claims about fishers that are alleged by SPI in this and other THPs. For example, the false claim is made on page 102 of this THP that that there is nothing in Federal or State documents that would lead SPI to conclude that the project (which would create 424 acres of clearcut units) and other private land management activities on SPI's private lands will have an adverse impact on fisher or its habitat. This is directly contradicted by the Conservation Assessment, which emphasizes that suitable fisher habitat is not open areas such as clearcuts or young pine plantations, but is instead denser mid-seral stage or older conifer forest stands with adequate canopy cover, with large trees, snags, and downed logs. SPI does not propose to leave any of its clearcut units with large trees or with adequate canopy cover to benefit fishers. Accordingly, SPI will convert a large percentage of the 424 acres from suitable fisher habitat to unsuitable habitat ... further adding to the

consistent destruction of suitable fisher habitat that has taken place for more than a decade in surrounding and adjacent SPI lands where suitable fisher habitat has been made unsuitable by even-age logging treatments, bulldozing, herbicides, and site preparation. The Conservation Assessment states: "In general, fishers use forest or woodland landscape mosaics that include conifer dominated stands, and they avoid entering open areas that have no overstory or shrub cover (Buskirk and Powell 1994). They select forests with fairly dense canopies at all spatial scales, and large trees, snags, and downed logs. A vegetated understory and large woody debris appear to be important for their prey species. In the eastern U.S., late-successional coniferous or mixed forests are believed to provide the most suitable fisher habitat because they provide an abundance of potential den sites and preferred prey species (Allen 1987), although managed forests with large trees, dense canopies, and understory structure are also used in California (Klug 1997, Self and Kerns 1992). Riparian areas may be important to fishers because they often provide concentrations of important rest site elements, such as trees with broken tops, snags, and coarse woody debris, as well as habitat corridors for movement (Seglund 1995), although the value of riparian as compared to upland habitats is incompletely understood. The potential value of forested riparian habitat varies in the west, but seems high in the relatively dry Sierra Nevada. In California, several studies have investigated habitat use by fishers. Studies in the southern Sierra Nevada (e.g., Mazzoni 2002, Zielinski et al. 2004a) showed that a significant, although not large, percentage of home range area was composed of stands of large trees generally greater than 61 cm [24 in] diameter breast height (dbh) and relatively dense canopy coverage (>50 percent). Forest stands with intermediate tree size (21-61 cm dbh) combined with dense canopy coverage were the dominant forest structure in both studies.

It should be noted that most studies used concave spherical densiometers to measure "overfisher" (looking upward) canopy cover at specific points of interest such as rest or den sites. Canopy cover measured by this technique differs in a yet-to-be-quantified manner from canopy cover as measured by aerial photo interpretation or geographic information system (GIS) interpretation of satellite imagery (looking downward). The fact that fishers select structural elements for denning and resting that are commonly found in old forest habitat but may be lacking in heavily managed landscapes or younger forests has led to an inaccurate perception that fishers require late-successional forests in the west. Fishers occur in landscapes with little to no late-seral forest. In northern California, fishers have been detected more often in mid-seral forests. Slauson et al. (2003) found that even in coastal areas with high amounts of old-growth habitat, second-growth redwood forests were most often used. Zielinski et al. (2004a) also found mid-seral conifer forest to dominate home ranges in coastal northern California, and Carroll et al. (1999) found the distribution of fishers in northern California was strongly associated with high levels of canopy closure. In studies of fisher habitat use on industrial timberlands, Self and Kerns (1992) and Klug (1997) found that mid-seral stands with denser canopies were most often used by fishers. Self and Kerns (1992) also found fishers selecting older-aged stands with relatively sparse canopy closures, but where an associated heavy shrub component contributed to the overall canopy closure. Stands with continuous dense

canopy coverage are important to fishers probably because they provide protection from avian predators and intercept snow. Fishers have been reportedly killed by hawks, eagles, and great horned owls (Bubo virginianus) (Douglas and Strickland 1987, Roy 1991). Dense canopy coverage may also protect preferred fisher prey from avian predators as well. Fishers reportedly avoid deep snow because it inhibits their mobility (Raine 1983), and winter snow depth may limit fisher distributions (Krohn et al. 1995, 1997). Both Self and Kerns (1992) and Jones and Garton (1994) noted a shift towards use of younger age stands in the winter, which may reflect both an increased prey availability and greater snow interception. Despite the reason for selecting stands with higher canopy coverage, many studies have shown that fishers avoid areas with little forest cover (Powell 1977, Jones 1991, Arthur et al. 1989a, Weir and Harestad 2003)." (Above taken from pages 15 and 16 of the Conservation Assessment) Also important is the information provided on page 24 of the Conservation Assessment, where the scientists layout what is essential for fisher habitat: "Habitat elements important to fishers at the landscape, home range, and rest/ den site level include: 1. Dense over-fisher canopy cover (Buck et a1. 1994, Buskirk and Powell 1994, Dark 1997, Carroll et a1. 1999, Zielinski et a1. 2004a, Zielinski et a1. 2004b, Yeager 2005), 2. Presence of large-diameter snags (Allen 1987, Powell and Zielinski 1994, Mazzoni 2002, Aubry and Raley 2006, Higley and Matthews 2006) distributed across the landscape, 3. Large downed logs (Buskirk and Powell 1994, Self and Kerns 2001, Slauson et a1. 2003, Aubry and Raley 2006) distributed across the landscape, which seem to playa larger role from northwestern Ca1ifornia northward, 4. Large-diameter greater than 61 cm (or 24 in) dbh live conifer and hardwood trees with decadence such as broken tops or cavities (Zielinski et al. 2004a,b; Yeager 2005; Aubry and Raley 2006; Higley and Matthews 2006), 5. Complex structure near the ground (e.g., downed logs, large downed branches, root masses, live branches, and other coarse woody debris) (Buskirk and Powe111994, Weir and Harestad 2003), 6. Multi-layered vegetation (vertical within-stand diversity) (Banci 1989), 7. Low road density (Dark 1997), 8. Mistletoe platforms (Arthur et al. 1989b, Jones, 1991, Self and Kerns 2001, Weir and Harestad 2003), and connectivity between suitable habitat patches (Coulter 1966, Earle 1978)." (page 24 of the Conservation Assessment) Past SPI and Forest Service clearcuts, visual retention logging treatments, shelterwood treatments, and road construction have all reduced suitable fisher habitat within the biological assessment area and within surrounding biological habitat areas that are of value for fisher. CSERC urges the Director to require SPI to acknowledge that it is not large trees that are planned to be grown at some point decades in the future that is the question for CEQA equivalent analysis of this project, but it is the direct loss of suitable fisher habitat that will now be lost if this project is approved as proposed. Claiming that large trees decades in the future will somehow benefit fisher does nothing for the next 20 years to compensate for the direct loss of suitable habitat caused by this project and past and planned projects. CSERC also re-states once again that the Conservation Assessment, based on the literature listed below, emphasizes that the presence of large diameter snags and large diameter downed logs are important, but when it comes to live large trees, it is the presence of decadence, with broken tops and cavities, that makes large trees important to

fishers, not just the size of the tree. Growing fast-growing plantation trees that are expected to grow to 36" dbh or larger and then harvesting those trees at 55-80 years will do little or nothing to provide fishers with the broken tops or cavities that are only created when mature trees become decadent, usually at 150 years or older.

Response: There is a discussion of Pine Marten and Sierra Nevada red fox in the section of this Official Response above titled WILDLIFE PROTECTION. CAL FIRE conducted an expanded search of the literature to determine independently if there was a potential of a significant adverse impact to Pacific Fisher. Some of the information from the literature search including the information supplied by the RPF in the THP is as follows:

Baseline information is provided in the publication California's Wildlife, Volume III, Mammals (1990) and identifies the following habitat requirements for the Fisher:

Feeding: An opportunistic feeder, the Fisher feeds on rabbits, hares, mice, porcupines, squirrels, mountain beavers, shrews, birds, fruits and carrion. They acquire their food by pouncing, chasing or digging.

Cover: The Fisher utilizes snags, logs, brush piles, slash, rock and cavities in large trees. Mature stands of dense trees are also utilized and provide cover, particularly within the winter period.

Reproduction: The fisher utilizes a variety of denning locations including protected cavities, brush piles, logs, and even upturned trees. Hollow logs, trees and snags are the most important.

Pattern: Suitable habitat is generally classified as areas of mature, dense forest stands with snags and greater than 50% canopy closure.

- While researchers have found significant fisher populations in the southern Sierra Nevada, they have been unable to detect fishers north of Yosemite National Park (Graber 1996).
- Elevation gradients are much steeper in the central and northern Sierra Nevada than in the southern Sierra Nevada fisher study area (Hubbard Scientific 1993).
- Steep elevation gradients cause a narrowing of the area of conifer forest that is free of relatively deep snow-packs in the winter.
- The fisher, as a species, is known to avoid areas that contain consistent, stable and relatively deep winter snow packs (Powell and Zielinski 1994, Krohn et al. 1997, Krohn et al 2000).
- The combination of steep gradients in the central and northern Sierra Nevada coupled with the fisher's avoidance of areas of deep snow effectively reduces the amount of potential habitat for pacific fisher in some areas between Yosemite to the California Cascades to about the size of a fisher's home range.
- Most of the area inventoried for fisher in the Sierra Nevada has been outside the conifer area that is relatively free of winter snowpack, (Zielinski et al. 1997) so it is not surprising that the detection effort has failed.
- No differences have been measured in the number of large trees available in areas of the Sierra Nevada that are known to support fisher populations and those areas of

the Sierra Nevada where researchers have been unable to detect fisher (USDA 2000).

- Pacific fisher natal and maternal den trees in California averaged 33.1" in dbh plus or minus 16.3" at one standard deviation (Truex et al, 1998) Pacific fisher rest trees on National Forest land in the Southern Sierra Nevada average about 27 inches DBH and occur most often in stands of small sawtimber (trees less than 24"dbh) (Zielinski et al. 1996).
- Pacific fisher rest trees on private forest land in the Klamath province averaged 31" in dbh +- 13 inches at one standard deviation (Self and Kerns 1995).

The majority of rest trees of Pacific fisher on private forest land in the Klamath province occurs in small areas with quadratic mean diameters (QMDs) greater than or equal to 10" DBH, with canopy closures exceeding 60% (Self and Kerns 1995). SPI has asserted in past THP's that the tree sizes described above are common on SPI's private forest land, currently averaging 18.9 per acre and are expected to increase in both amount and distribution over time as a result of proposed SPI management practices. Stand conditions used for resting by Pacific fisher occur throughout SPI's private forest land and are projected to increase in amount and distribution in the future under SPI management practices. Additionally the RPF states that, "*Since it forages in a wide array of habitats including its rest tree habitats, its' foraging habitat will always remain available under SPI's management.*"

Analysis of terrestrial habitat within the THP also serves to evaluate the potential habitat pre- and post harvest, although not specific to Pacific fisher. Terrestrial habitats considered include hardwood cover, presence of snags/dens/nest trees, amount of large woody debris, presence of multi-story canopy, road density, presence of late seral characteristics and late seral stage forests. The RPF discusses these elements within the THP and has determined that the operations as proposed will not significantly affect these elements within the assessment area.

A report by the USFWS (2004) is found in the Federal Register, Vol. 69, No. 68, Thursday, April 8, 2004, which is data developed in response to a petition to have the Pacific Fisher listed as an endangered species. The Pacific Fisher was not listed, as is outlined in the report. Some of the information from this recent review as follows:

•There have been no good population estimates for fisher populations in California....so it is unknown precisely how many fishers exist. Estimates of fisher abundance and vital rates... are very difficult to obtain (Douglas and Strickland 1987) and may vary widely based on habitat composition and prey availability (York 1996).
•Fishers have large home ranges and male home ranges are considerably larger than those of females (Buck et al. 1983; Truex et al. 1998). Fisher home range sizes across North America vary from 3,954 to 30,147 acres for males and from 988 to 13,096 for females (Powell and Zielinski 1994; Lewis and Stinson 1998). However, Beyer and Golightly (1996) reported that male home ranges in northern California may be as large as 31,629 ac.
•According to Seglund (1995), riparian areas are important to fishers because they provide important rest site elements, such as broken tops, snags and coarse woody

debris.

- The key aspects of fisher habitat are best expressed in forest stands with late-successional characteristics. Fishers use habitat with high canopy closure, large trees and snags, large woody debris, large hardwoods, multiple canopy layers, and avoidance of areas lacking overhear canopy cover (Aubry and Houston 1992; Buskirk and Powell 1994; Buck et al 1994; Segund 1995; Klug 1996; Dark 1997; Truex et al. 1998; Mazzoni 2002; Weir and Harestad 2003; Zielinski et al. In press 2003b, in press 2003a)..... However, intensive management for fiber production on industrial timberlands does not typically provide for retention of these elements. It is unlikely that early and mid-successional forestry, especially those that have resulted from timber harvest, will provide the same prey resources, rest sites and den sites as more mature forests (Zielinski and Powell 1994).

- While the Forest Practice Regulations may incidentally protect some habitat or habitat elements used by the fisher, the rules do not require fisher surveys, protection of fisher or fisher den sites, or a mechanism for identifying individual or cumulative impacts to the fisher or its habitat. The California FPRs provide specific enforceable protections for species listed as threatened or endangered under CESA or the ESA, and for species identified by the BOF as sensitive species; however, the fisher is not currently on any of these lists.

The definition for *"functional wildlife habitat"* in 14 CCR Section 895.1 states that *"the habitat components must be in sufficient quantities and arrangement to support the diverse assemblage of wildlife species that are normally found on or use forestlands within that area."* Where these species are not found or do not use the area, the rule would therefore not apply. It should be noted that the Pacific fisher is said to be absent from this portion of the Sierra Nevada. (Zielinski 1995; Sierra Nevada Forest Plan Amendment 2000).

CAL FIRE notes that the area encompassing this project has been continuously harvested by numerous private industrial timberland owners for decades and does not posses all the very specialized elements of habitat described in the research literature as being favorable for Pacific Fisher in the Federal Register as quoted above. The area of the THP itself does not contain the late seral stage habitat elements that are said to be the most desirable habitat. There appears to be nothing in the Federal documents that would lead to a conclusion that private land management activities of the type described in this THP would lead to a finding of a significant adverse impact on the fisher or its habitat, especially in the area where the species is said to be absent (Zielinski et al. 1996; Sierra Nevada Forest Plan Amendment 2000). In fact, in their planning efforts, the federal government seems to assume that private lands will contribute nothing toward preserving fisher habitat or the species viability. (USDI 2001, Exhibit 7)

Based upon the available information, including information available from federal studies, the long term impact of SPI's management practices throughout the Sierra will be to increase the habitat of species utilizing dense forests with a large tree component such as the Pacific fisher and California spotted owl. It is noted that SPI's forests are already in a managed condition given a hundred years of past harvesting activity by numerous previous landowners. Past selective logging has had an adverse effect on tree size and conifer volume per acre. These

conditions will gradually be reversed over the next planning horizon by an increase in average tree size and volumes per acre. (see SPI Option "a" document, Exhibit 15).

The multidisciplinary Review Team determined, based on review of the information contained within the plan and additional information obtained through the course of review, that the RPF adequately assessed the potential impacts to the Pacific fisher and does not find a potential significant impact to the species. CAL FIRE has independently addressed the issue of Pine Marten and Sierra Nevada red fox in this Official Response and does not find evidence of a significant adverse impact as the area of the THP will continue to have a variety of habitat types including non-timber areas, areas that will have continued forest cover following logging, areas that are not being harvested at this time, WLPZ areas that have canopy retention in conformance with BOF regulations, early successional forest areas, and an extensive amount of federal lands within the assessment area that are not likely to be intensively harvested. It is noted that these furbearers have a relatively large home range and have mobility that can cover expansive territories that contain a variety of habitat types.

Future projects were considered within the assessment area to the extent that they are known as reasonably foreseeable probable future projects and given the long term strategy of continued even-aged management as expressed by SPI in its' Option "a" document. However, it must be stated that many factors can come into play to alter the course of future management and that some of these are natural events, such as fires or insect or disease in the timber stand, but perhaps just as important are unknown future political events such as legislation, initiatives or regulations, that could cause alterations in forest management. For that reason, currently unknown future projects will have to be re-evaluated at the time of plan submission and cumulative impact issues with respect to the Pacific fisher and other species. Large trees will likely continue to be found on USFS lands which occur within and outside the biological assessment area and efforts are being made there to protect and restore habitat (Sierra Nevada Forest Plan Amendment 2000). Pursuant to the rules of the BOF, the Pacific Fisher is not a "listed species" in the definition of 14 CCR Sec. 895.1. Therefore, the level of protection in the regulations exists in the language of protection for non-listed species found in 14 CCR Sec. 959.4, which states that "*where significant adverse impacts to non-listed species are identified, the RPF and Director shall incorporate feasible practices to reduce the impacts as described...*"

There has been no finding or substantial evidence that the timber operation would result in significant adverse impacts to Pacific Fisher, which is likely to be absent from the area. (Zielinski et al. 1996; Sierra Nevada Forest Plan Amendment 2000). From the information regarding the absence of fisher north of Yosemite National Park, there is no indication that additional surveys would likely result in discovery of the species in this THP area. As discussed elsewhere in the Official Response, the THP is not at the ideal elevational range for Pine Marten. Tree retention in WLPZ areas will insure at least 50% of the overstory trees will remain as well as down woody material. In the absence of evidence to support a significant adverse impact to a non-listed wildlife species, CAL FIRE has found that the revised THP and this Official Response discusses the possible impacts to Pacific Fisher or Pine Marten and finds the THP in conformance with the Forest Practice Rules and regulations.

CAL FIRE considered the information presented from the Conservation Assessment publication that was said to be recent information from the Pacific Southwest Region, USFS. One stated concern was that the SPI overstated the case for the current population of Pacific Fisher as being the same as it was 80 years ago. However, the quote from the THP about the population of fisher pointed out that the period 80 years ago was a particularly bad time for fisher population since it represented a time of high levels for trapping fisher for fur. The quote merely states that this was the lowest point of population in "historic" times and that the population now may not be any worse than it was at this low point. CAL FIRE could not find a quote in the Conservation Assessment that clearly refuted this estimation from the THP and could not find a statement in the information presented to the Department that indicated that the population decline occurred over "recent decades". At any rate, the information in the THP is referenced to its source and does not represent an unsupported conclusionary statement that was "made up" by the plan submitter.

Another concern was that the THP was alleged to claim that clearcuts contained appropriate crown density to be useful for Pacific fisher habitat and that the Conservation Assessment refuted this claim. However, CAL FIRE noted that the THP does not claim that clearcuts contain necessary crown density. Instead the THP states that, after a time, a fully stocked plantation of fast growing trees that have been planted in the clearcut would contain appropriate crown densities that have been reported to be useful for fisher habitat in the Conservation Assessment document and in other studies. While one may be able to infer from the information presented that ten or twenty year old trees in a plantation do not represent prime fisher habitat, especially for nesting purposes, the literature presented does not rule out that plantation densities could reach levels where fishers have been found in past studies. In fact, one quote from the Conservation Assessment stated: "*The fact that fishers select structural elements for denning and resting that are commonly found in old forest habitat but may be lacking in heavily managed landscapes or younger forests has led to an inaccurate perception that fishers require late-successional forests in the west. Fishers occur in landscapes with little to no late-seral forest.*" As for the case of whether plantations with high canopy cover would be used at all because the trees themselves are not "old" enough or the canopy was not high enough, there is a quote in the Conservation Assessment from Self and Kerns (1992) who: "...found fishers selecting older-aged stands with relatively sparse canopy closures, but where an associated heavy shrub component contributed to the overall canopy closure." The quote documents that a low-growing "heavy shrub component" provided useful cover and counted toward the total canopy cover needed for fisher, perhaps in a manner that younger dense canopy plantations associated with nearby WLPZ retention areas and unlogged adjacent areas would combine to provide at least foraging habitat. At any rate, CAL FIRE did not find that statements made in the THP were directly refuted by findings as presented from the Conservation Assessment document.

An additional concern seemed to relate to statements in the Conservation Assessment that were alleged to not support the claim that the THP occurred in an area of the Sierra Nevada where the species has been extirpated. However, the opposite is true and the Conservation Assessment confirmed previously mentioned findings indicating that: "*Recent systematic*

surveys indicate that fishers are absent from their former range in the central and northern Sierra Nevada, northward of Yosemite National Park to the southern Cascade Range (Zielinski et a1. 1995, 2005), and now occupy less than half their historical Sierra Nevada range. This gap in distribution effectively isolates the existing southern Sierra Nevada population from extant populations in northern California and southern Oregon. A regional monitoring program (Zielinski and Mori 2001) continues to monitor for the presence of fishers throughout the Sierra Nevada. Annual reports from 2002 to present are available through the Forest Service Regional Office or any Forest Service office in the Sierra Nevada." As a result of this absence of species in the THP area and wider assessment area for the THP, CAL FIRE repeats the previous finding for the requirements of the rules of the BOF where the definition for *"functional wildlife habitat"* in 14 CCR Section 895.1 states that *"the habitat components must be in sufficient quantities and arrangement to support the diverse assemblage of wildlife species that are normally found on or use forestlands within that area."* Where these species are not found or do not use the area, the rule would apparently not apply.

A final concern is the THP fails to consider its own contribution to the decline and fragmentation of old forest habitat in the Sierra Nevada ecosystem. The definition of, "old forest habitat" is quite variable depending on which individuals or sources are being queried for the definition. As per 14 CCR 898, "The Director shall review plans to determine if they are in conformance with the provisions of PRC 4582.75 which requires that rules adopted by the Board shall be the only criteria employed by the Director in reviewing plans pursuant to PRC 4582.7." Therefore, the definition contained within the Forest Practice Rules will be utilized to facilitate this response.

14 CCR 895.1 defines "late succession forest stands" as stands of dominant and predominant trees that meet the criteria of WHR class 5M, 5D, or 6 with an open, moderate or dense canopy closure classification, often with multiple canopy layers, and are at least 20 acres in size. Functional characteristics of late succession forests include large decadent trees, snags, and large down logs. The following table is a reproduction of the WHR size class and density table as presented on page 16, *A guide to Wildlife Habitat of California*:

Standards For Tree Size				
WHR	WHR Size Class	Conifer Crown Diameter	Hardwood Crown Diameter	DBH (diameter breast height)
1	Seedling Tree	N/A	N/A	<1"
2	Sapling Tree	N/A	<15'	1" – 6"
3	Pole Tree	<12'	15' – 30'	6" – 11"
4	Small Tree	12' – 24'	30' – 45'	11" – 24"
5	Medium/Large Tree	>24'	>45'	>24"
6	Multi-Layered Tree	Size class 5 trees over a distinct layer of size class 4 or 3 trees, total tree canopy exceeds 60% closure.		

Standards For Canopy Closure		
WHR	WHR Closure Class	Ground Cover (Canopy Closure)
S	Sparse Cover	10 – 24%
P	Open Cover	25 – 39%
M	Moderate Cover	40 – 59%
D	Dense Cover	60 – 100%

The RPF certifies under Item #34 and within the biological assessment of the THP that there will be no harvesting in areas which meet the late succession forest stand definition. The RPF further asserts that there are a small number of acres within the assessment area that are managed by public agencies and that this management will likely continue to afford habitat given policies of the federal government. Given that the project area itself currently does not contain late seral stage habitat, the project will not result in any additional fragmentation of old forests habitat beyond that which currently exists.

The presence of snags/dens/nest trees, large woody debris, and multi-story canopy are also discussed within the biological impact section of the THP. Presence of multi-story canopy stands is low to moderate in the biological assessment area, and in the project area it mainly occur within watercourse and lake protection zones. It is estimated that these areas, due to retention standards prescribed within the THP, will remain following harvesting activities; therefore, a reduction in this habitat type, which may be substituted by some "old growth" dependent species will remain following harvesting proposed by this THP.

Large woody debris are described as being variable and clumpy in the assessment area due to past management activities and as the result of fire. No decrease or increase of these materials is predicted as a result of this project. The RPF also states that due to the amount of snags in the area, additional large woody debris will be recruited as the snags fall to the ground.

Snags densities are described as being moderate to "high" and scattered throughout the assessment area. Due to the size of the THP area and the proposed activities prescribed, it is not likely that a significant decrease will occur within the assessment area at this time. Additionally, the THP states that SPI company policy will provide this habitat element into the future by establishing guidelines by which to evaluate this habitat component. It is also important to note that the THP is near U.S. Forest Service Land, for which there is currently no plans to harvest trees and therefore there is a significant source of snag recruitment for the area.

CAL FIRE considers that the information provided in the THP is reasonable to determine that an adequate consideration has occurred consistent with the rules of the Board. CAL FIRE has considered the direct effects of this project and the cumulative effects of this project in combination with past, present and foreseeable future projects. The multidisciplinary Review Team, in combination with an on-the-ground inspection by the CAL

FIRE forest practice inspector, concurs with the RPF's determination that the THP as proposed will not likely significantly impact wildlife with respect to the amount of large woody debris, snag/den/nesting trees, and multi-storied stand structure. Additionally, due to the lack or non-existence of late seral habitat on the project area itself, the THP will not result in a further decrease in "old forest habitat", herein defined as "late seral stage habitat as per BOF rules. CAL FIRE further finds that BOF regulations address the fragmentation issue in those situations where late seral stage habitat exists in the pre-harvest stand.

Also, the California Wildlife Habitat Relationship (WHR) system finds that there are no currently listed species, nor non-listed species that do not find moderate habitat capability in WHR classes other than those defined as late seral stage habitat by the Board of Forestry and Fire Protection. In the WHR system, moderate habitat capability is defined as habitat capable of sustaining the population. While many species do have special element needs in order to use habitats effectively, those special needs include snags, down logs, riparian inclusion, and hardwoods are specifically provided for by the RPF in the plan. In this plan, significant percents of the area, both in the landowner's ownership and outside, are occupied by WHR 4M and 4D habitats, which are not in any way fragmented and provide continuity across the landscape in addition to that provided by the WLPZ areas.

7. **Concern:** There was a concern that Special Status plant species are not assured of necessary protection. On pages 82-83 and on pages 19-20, the THP covers botanical resources and provides a positive description of at least 13 Special Status plant species that may be present within the project area. The document goes on to claim that botanical resources will have surveys done in suitable habitat and that such surveys will provide assurance that the rare plants will be protected. CSERC strongly disagrees with such misleading claims and assurances. First, there is no condition prescribed which will assure that professionally competent, professionally-certified botanists or other highly-trained persons will actually be given the responsibility to undertake botanical surveys. Instead, foresters with limited training are expected to locate, identify, and determine mitigation for the at-risk plant species. Having SPI staff hurry through project units in areas supposedly suitable will neither provide unbiased, scientific information nor will there be any assurance of the adequacy of such surveys. CSERC disagrees that such surveys will protect potentially present sensitive plants and insure that potentially significant impacts to these plant species do not occur. In particular, we disagree with THP language that suggests that herbicides can be applied within sensitive plant populations during periods when the plants are not highly visible without affecting such sensitive plant populations. There is absolutely no assurance that foresters or other SPI personnel have performed or will perform the necessary scientific plant surveys in a manner that is consistent with scientific protocols. Even with the best of intentions, foresters are not motivated to search out plants that will directly interfere with their planned logging operations. The fox is guarding the hen house. The THP provides no specific assurance that any prescribed protocols for the surveys will be followed for all suitable habitat prior to plan approval, so at this time, if the Director approves this THP, SPI staff will only need to do casual walk-throughs within any specific unit during the appropriate survey period, and they will have complied with the THP. No

information is provided in this THP to show that unbiased botanical experts will undertake timely, protocol-based plant surveys in all suitable habitat in all evenage units prior to implementation of this THP.

Response: CAL FIRE notes that RPFs typically have had training in botany. Trees and shrubs are a part of the plant community and foresters typically receive training in plant identification utilizing plant keys. RPFs are certainly familiar with plant species that occur within a forested environment where they work and are familiar with the locations of the THP that they prepared and in all likelihood did most of the ground preparation of the plan and have walked all of the area and made observations with respect to plants existing in the area. For SPI in particular, THP submittals have indicated annual training which involves reviewing sensitive plant lists, samples of actual plants, and viewing videos and slides all of which is provided by Dr. Dean Taylor of the Jepsen Herbaria. Anyone submitting comments with respect to the bias of an RPF is perhaps not familiar with the licensing standards for an RPF nor is familiar with the disciplinary methods that are available under the law. Additionally, there is publicly available information about the number of individual plants and plant species that have already been identified and protected on SPI lands at the website www.spi-ind.com.

CAL FIRE finds that the plan as proposed and approved is in compliance with the regulations of the BOF. The plan utilizes data from the NDDB and adds data from a contracting member of the Jepsen Herbaria in Berkeley, California to "scope" out the plant species that might be likely to occur in the area. CAL FIRE added local knowledge of the surrounding area in reviewing the THP and additionally added specific knowledge of the THP area from past submissions. A copy of the plan was sent to DFG for their review and biological input as a part of the Interagency Review Team and two representatives from DFG attended the PHI. No issues relating to either the adequacy of botanical surveys or protections for wildlife species were raised by DFG during the PHI which required additional mitigations to the THP.

There is no requirement in the Forest Practice regulations that a "certified botanist" be used to conduct surveys although the information certified by the RPF in the plan is subject to disciplinary action if it is not correct and supportable. CAL FIRE finds that the information provided in the THP provides the information necessary for CAL FIRE to make a determination concerning the potential environmental impacts of the project on sensitive plant species. For the surveys done to date, special status plants were actually found by those foresters who conducted the surveys and mitigations were present in the approved THP to protect those plants. The inference is that the surveys done by foresters were effective in locating special status plants. CAL FIRE further finds that the plan as proposed and approved is in compliance with the regulations and intent of the BOF and other associated rules.

8. **Concern:** There was a concern that the Squiggly THP acknowledges that herbicide use is a reasonable probability and that eliminating its use is not feasible. Accordingly, the Director should conclude that herbicide use is reasonably foreseeable and thus part of the activity constituting the project covered by this THP.

Consequently, the Director has the authority to review that use, assess the potential environmental impacts of that use, and impose feasible alternatives or mitigation measures to lessen or eliminate any substantial, or potentially substantial, adverse change in the environment. At this time, the THP does not contain the feasible alternatives or mitigation measures that could lessen or eliminate such adverse changes in the environment. In the past, the Director has found that certain information about herbicide use was speculative. Even if supported by substantial evidence, that does not preclude an inquiry into whether CDF fulfilled its procedural obligation to obtain and disclose information regarding potential herbicide use. The agency inaccurately described the states pesticide regulatory program, which leads to the overly broad conclusion that compliance with label directions and other restrictions in applying registered herbicides will preclude a finding that such application would have a significant adverse effect on the environment. In the past, CDF relied upon information about herbicide use that was not disclosed in the administrative record. The inadequate disclosures affected the usefulness of the THP's and official responses as informative documents, while adequate disclosures might have shown that further details of the prospective herbicide use were reasonably foreseeable. Any finding that the Director makes regarding the applicant's future compliance with herbicide regulations must be based on the evidence in a properly prepared administrative record; future compliance must not be assumed. Overall, the Herbicide section is inaccurate, misleading, and insufficient For example, on page 103, the document claims that on any individual acre, potential herbicide use will be limited to once or twice every 50-80 years. This is in direct conflict with statements made by SPI foresters to CSERC staff that a particular even-age cut unit may receive as many as four or 5 separate chemical treatments in a 10-year period. Some sites are treated prior to logging. Almost all sites are treated post logging for site preparation. Almost every site is treated as a release treatment after the conifer seedlings are planted. Many sites are treated for a second release treatment 2 to 5 years after planting. Some sites have clearly received herbicide treatments 10 years after planting if competition by brush is deemed unacceptable. These multiple chemical treatments are not honestly admitted nor evaluated in the THP. Due to the CEQA equivalency of the THP, it is essential that all information that provides decision-makers with important information on likely environmental impacts should be included in the THP. SPI claims that herbicide applications to small areas do not create a substantial or potentially substantial adverse change in the environment and that impacts to target plants are short-lived. Both claims are incorrect. First, since so many acres of this THP project will be treated by even-aged logging methods, it is almost certain that herbicides will be applied to most of those acres, because our staff has consistently seen this treatment done on almost all SPI units that we have visited and monitored. Second, this is not a "small" area that will be treated with herbicide. Likewise, the claim that impacts to target plants are short-lived is false. Target plants die. The impacts are permanent, not "short-lived!" The plants die. To make any claim that impacts are short-lived is to be abusing logic and truth. Killing something is not a short-term impact. Killing plants is something that creates a permanent effect. In the past CSERC has requested that SPI be required to lay out and disclose all the past

herbicides applied on regeneration units in the company's THP's across the general region of the current project. On page 103 of this document, SPI claims past owners did not use herbicides for regeneration efforts. Obviously, CSERC is not asking for past owners' records, only SPI's. SPI acknowledges in the THP that CEQA requires disclosure of past projects or effects that are ongoing and may add to significant adverse effects. BUT SPI fails to any such information for the company's herbicide applications within the planning watershed, the overall watershed, or within Calaveras County. This is the sole opportunity for the public to learn that important information and to be able to comment upon the potential effects of such herbicide use. Furthermore, there will never be any site-specific documentation done at a later period of time whereby the interested and concerned public can provide input or attempt to block harmful use of herbicides on the sites in question. For instance, if SPI decides in the future to apply herbicides by aerial application from a helicopter, there is a wide range of highly likely environmental consequences that will occur. Non-target plants will be sprayed as the spray falls to earth. Spray will bond with some soil particles that may wash into streams, affecting water quality. Amphibians and other sensitive receptors have greater potential to be directly affected than if ground spraying is used. The use of hexazinone may result in the chemical being active in the soil at low concentrations for up to three years after treatment. The Stanislaus National Forest has cited past studies of amphibians and hexazinone impacts on fish and amphibians. The overall risk to the ecosystem is clearly significant if analysis considers the use of herbicide formulations across hundreds of acres of this project site, in combination with all other recent past and current chemical treatments taking place in the local mountainous region. There is a lack of appropriate consideration of alternatives to the herbicide use, reduced herbicide use, or no herbicide use.

Response: THP 4-08-005/CAL-1 proposes the use of silvicultural methods where artificial regeneration will be required in order to establish a new crop of trees. Typically, the Plan Submitter (SPI) has utilized herbicides to retard the encroachment of brush and weed species. Page 103 of the THP states "Sierra *Pacific Industries employs an Integrated Vegetation Management program to achieve our vegetation management goals.*" Herbicides may be used for site preparation purposes and/or may be used later where needed for release of conifers where their survival is threatened by competition from unwanted brush or weed species. Page 6 of the THP indicates broadcast burning and mechanical methods for site preparation, but also indicates that "*SPI has used herbicides in the past for vegetation management in certain even-age management units. If herbicides are used, their use and application will be prescribed on a site-specific basis by a licensed PCA.*"

Page 101 of the plan further states: "*At the present time, it is not possible to predict (without speculation) which herbicide, in which area, in which concentration, at which time will be used, if at all.*" Regarding what is known, or more importantly not known about trying to determine the impacts of herbicide use is the lack of studies that have been done and the lack of information that is available in the literature. Regarding this the study (Miller & Miller 2004) stated: "*As with other aspects of single-application site-preparation treatments,*

production of wildlife forage species across broad geographic areas likely is influenced by a variety of factors including herbicide specificity, rate, timing of application and edaphic variables. Additionally to date, no comprehensive studies have evaluated the impacts of tank mixtures of herbicides, multiple herbicide treatments for site preparation and release, or the combined impacts of herbicides, mechanical tillage, and fertilization." With this shortage of data and lack of studies in mind combined with the fact that the exact products and tank mixes to be used are not known so far in advance, the rules of the BOF in Technical Rule Addendum No. 2 state that: *"The RPF preparing a THP shall conduct an assessment based on information that is reasonably available before submission of the THP."*

Previous landowners of the property on and surrounding this THP included Georgia-Pacific, Georgia-Pacific West, Bendix Corporation, American Forest Products and subsidiaries of these companies. These previous industrial landowners employed a mixture of silvicultural methods where artificial regeneration was not necessarily used and where herbicides were only occasionally used mainly for control of areas where there was invasion of unwanted species such as bear-clover. In some areas, these landowners employed repeated use of uneven-aged methods which selected the best and fastest growing trees as frequently as twice per decade. This has resulted in areas and blocks of timber in which growth is not maximized and where, in some cases, the species composition of the resulting forest is skewed towards fir and cedar rather than the historic levels of pine species. The current landowner has employed the use of even-age methods in the general project area for the past decade and has used herbicides to control competing vegetation. This past use of herbicides within the general area of this project has not resulted in CAL FIRE finding significant adverse impacts to the environment. The potential for use of herbicides is included in the THP in the event that some treatment of competing vegetation develops in the future or is needed in site preparation activities. As these events are dependent on natural conditions that would only occur after the actual harvest of timber, it cannot be predicted in advance with any degree of accuracy the extent or type of chemical application that might be needed. It is inappropriate for a PCA to speculate the amount, timing and chemical tool to be used so far in advance of actually being able to observe the vegetative response that will occur in the future. The use of this tool may actually occur at a time when the THP itself has expired and when CAL FIRE no longer has authority over activities that occur on this private property. But, while CAL FIRE authority expires, there is still the requirement for the landowner to comply with the laws and regulations from the State DPR, including the PCA and PCO licenses and requirements. Thus in the post CAL FIRE period, there are still protective measures and mitigation of impacts.

The use of herbicides as typically applied for forest management purposes are constrained by the protection measures described in the plan and label requirements. Many of the products used in forest management are also used for agriculture and in urban/suburban settings. The rotation of a forest is on the order of decades with herbicides, if needed, being applied once or possibly two or three times during that rotation of 50 to 80 years in Sierra mixed conifer. In an agricultural or urban/suburban setting, herbicide application might be annually and often times it would be several times in a single year. Actual application methods in forest management or in agriculture may be similar and could include backpack sprayers, hack and squirt, ground mounted sprayers or use of aircraft. In

contrast, SPI states on pages 114.2 & 114.3 of the THP that application of herbicides, if necessary, will be done under the advice of a licensed pest control advisor (PCA) and the actual application will be under the direct supervision of a licensed pest control operator (PCO).

In a forest setting, buffers protecting ponds, wet areas and watercourses are required by the Forest Practice Rules. The THP applicant has adopted the Forest Practice rule buffers, which are typically larger than buffers specified in the labels for most herbicide products as indicated following page 114.3 of the plan; "*As a point of clarification, SPI would like to define 'required buffers' as used in item 8 to include all Forest Practice Rule required buffers even though commonly the herbicide labels allow narrower stream protection. In addition, 'carefully avoided' means no herbicide will be applied in these buffers* The expectation that watercourses are adequately protected in California forest management that are subject to the Forest Practice Rules is supported by the fact that water monitoring downstream of timber harvest units treated with ground based herbicides has not detected herbicide residues. (http://www.cdpr.ca.gov/docs/empm/pubs/tribal/min06-98.htm).

Likewise, in agricultural settings many adjacent fields may be treated during the same calendar year if not at the same time. Harvest restrictions on even-age management minimize the potential that adjacent areas will require treatment in the same year. In the Forest Practice Rules, 14 CCR 953.1(a)(3) and (4)(A) stipulate: "*Evenaged regeneration units within an ownership shall be separated by a logical logging unit that is at least as large as the area being harvested or 20 acres, whichever is less, and shall be separated by at least 300 ft. in all directions*" and "*Within ownership boundaries, no logical logging unit contiguous to an evenaged management unit may be harvested using an evenaged regeneration method unless the following are met: ... The prior evenaged regeneration unit has an approved report of stocking, and the dominant and codominant trees average at least five feet tall, or at least five years of age from the time of establishment on the site, either by planting or by natural regeneration. If these standards are to be met with trees that were present at the time of the harvest, there shall be an interval of not less than five years following the completion of operations before adjacent evenaged management may occur.*"

In a forest setting, relatively small areas averaging approximately 20 acres in size, scattered over the landscape may be treated. 14 CCR 953.1(a)(2) stipulates: "*The regeneration harvest of evenaged management shall be limited to 20 acres for tractor yarding. Aerial or cable yarding may be 30 acres. Tractor yarding may be increased to 30 acres where EHR is low and the slopes are <30%. The RPF may propose increasing these acreage limits to a maximum of 40 acres ...*" Any increase in acreage above the 20 or 30 acres limits must be approved by the Department. In THP 4-08-005/CAL-1 the even-age harvest areas average less than 20 acres in size. The units are separated by a distance of 300 feet or more.

Exposure to the herbicides used in forestry settings or related chemicals off site is not common or frequent by the general public as the area is not heavily used or traveled and is private property. The treatment sites themselves are small, widely scattered. Page 100 of

the THP reveals that fishing, hunting, hiking and similar activities are generally allowed on these timberlands, but that overnight camping is not allowed.

Winton road could be used by the public to access the project area. However, these are secondary roads and are not heavily traveled by the public and the public would have to purposely get out of a vehicle and walk into the forest area from Winton road onto private land in order to be exposed to herbicide treatment. The project is not located close to a populated area. Access by the general public to any areas treated by herbicides would not be expected to be common or frequent.

With respect to the analysis of chemicals typically used on SPI lands within Calaveras County, there are publicly available summaries prepared by the California Department of Pesticide Regulation (http://www.cdpr.ca.gov) for 2006 (the most recent posted information) which show that, for the state as a whole, forest/timberland use of pesticides ranks 59th and 54th by weight of pesticides applied and by acreage treated respectively. (See also Exhibit 14) Statewide the use of pesticides on forest/timberland, by weight was less than 1% of that used on wine grapes and less than 1% of that used on other grapes. Compared to the total for the state the weight of pesticide use for forest/timberland was approximately 0.2% (less than 1%). Likewise the use by acreage is less than 1% of the area of cotton or grapes (wine and other grapes combined) that was treated. Compared to the total for the state the area of pesticide use for forest/timberland was approximately 0.5% (less than 1%). Calaveras County ranked 50th in pesticide use (by pounds applied) out of the state's 58 counties. The weight of pesticide use in Calaveras County was approximately 0.02% (two hundredths of one percent) of that used in the state as a whole in 2006. Page 101 of the plan lists the herbicides currently utilized on the ownership for vegetation management. These are Imazapyr, hexazinone, Glyphosate, Atrazine, and Triclopyr.

With respect to the potential for environmental effects of herbicides that have been used in the past by SPI and are the most likely ones to be used in the future as stated in the THP, CAL-FIRE considered the information publicly available in the literature as follows: For imazapyr, the United Nations Environmental Programme (UNEP) does not list imazapyr as a persistent organic pollutant (current as of February 2002 and not expected to change in the near future); the World Health Organization (WHO) Acute Hazard Rating is "Unlikely to present acute hazard in normal use"; it is registered for use in South Africa, Australia, New Zealand, Finland, Hungary, Portugal, United Kingdom, Canada and the United States. Only about 3 pounds of imazapyr was used in forestry applications in Calaveras County in 2006 on 66 acres. Calaveras County in 2006 accounted for less than 1% of the imazapyr used statewide for forest reforestation.

(http://www.pesticideinfo.org/Detail_ChemReg.jsp?Rec_Id=PC33386)

The Imazapyr used on timberlands by SPI goes under the trade names of Chopper or Arsenal. While this product can be applied by air, it is applied primarily by low-volume hand-held spray equipment or basal treatment, cut stump treatment or tree injection or frill. Imazapyr can remain active in the soil for 6 months to 2 years. It is strongly adsorbed in soil and usually found only in the top few inches. It is soluble in water. It has a low potential for

leaching into ground water. It may move from treated areas into streams and use of a streamside management zone can significantly reduce the amount of offsite movement in stormflow. The half-life of imazapyr in water is about 4 days. Imazapyr is considered low in toxicity to invertebrates and practically non-toxic to fish, mammals and birds. It is of low toxicity to bees. Like many herbicides, it could be a hazard to endangered plants if applied to areas where they grow, but would probably not be a hazard to endangered animals because of low toxicity. Lab studies with imazapyr in rats indicated no evidence of teratology and tests were negative for mutagenicity. Given the scientific and toxicological information in conjunction with the speculative information that the Department has with respect to the timing, amount of product, weather conditions at the time of application, or even if the product would be used at all, CAL FIRE finds that there is no substantial evidence that imazapyr use would be provide a significant human health hazard or significant adverse environmental impact when used in accordance to label or other regulatory restrictions and when used in reforestation in a typical manner.

For glyphosate, the United Nations Environmental Programme (UNEP) does not list glyphosate as a persistent organic pollutant (current as of February 2002 and that status is not expected to change in the near future); the World Health Organization (WHO) Acute Hazard Rating is "Unlikely to present acute hazard in normal use"; it is registered in 14 African countries, six European countries, Australia, New Zealand, Philippines, Canada and the United States. Less than 1% of the glyphosate used in California in 2006 was used in forests. Over 90% of the glyphosate used in California in 2006 was used on right-of-ways, nuts (almonds, walnuts, and pistachios), grapes, cotton, fruit (nectarines, peaches, plums, cherries, and oranges), tomatoes, landscaping, and wheat. (http://www.pesticideinfo.org/Detail_ChemReg.jsp?Rec_Id=PC33138) Of the top pesticides used on forests in California in 2006, 76,000 gross pounds of glyphosate isopropylamine salt and 10 gross pounds glyphosate were applied to forest lands. In comparison 290,000 pounds glyphosate (about 4 times that applied to forests) were applied to grapes, which provide the raw material for a product consumed by people. Other food products that were treated with greater amounts of glyphosate isopropylamine salt than forestlands in 2006 include almonds, oranges, table/raisin grapes, walnuts, pistachios, lemons, avocados and peaches. For the state as a whole, nearly 5 million pounds of glyphosate were used on reportable crop and structural uses. For all uses, including urban and household, approximately 17,000,000 pounds of glyphosate were sold in California in 2006. Forestland use is a very insignificant portion of this total. (http://www.pesticideinfo.org) One of the articles cited in the concern letter (Relyea, 2004) underscores how prevalent the public use of glyphosate is; "Glyphosate is the second most widely used pesticide in the United States. It is currently applied to 8.2 million ha of cropland in the Untied States including 2 to 3 million kg for home and garden applications and 4 to 6 million kg for commercial and industrial applications ..." 10-20% of the application of Glyphosate (Roundup) is attributed to homeowners who do not have to consider cumulative impacts when purchasing or applying these materials.

Glyphosate, also known by the trade name Roundup, is used to control grasses, herbaceous plants including deep rooted perennial weeds, brush, and some broadleaf trees and shrubs. It is applied to foliage and is adsorbed by leaves and rapidly moves through the plant. It acts by preventing the plant from producing an essential amino acid.

Aminomethylphosphonic acid is the main break-down product. It is generally not active in soil and is not usually absorbed from the soil by plants. It remains unchanged in the soil for varying lengths of time, depending on soil texture and organic matter content. The half-life of glyphosate can range from 3 to 130 days. The surfactant in roundup has a soil half-life or less than one week. The main breakdown product of the surfactant is carbon dioxide. The potential for leaching into groundwater is low as it is strongly adsorbed by soil particles. It does not evaporate easily. Roundup has no known effect on soil microorganisms. Contact with non-target plants may injure or kill plants and therefore, use over the top of established conifers is mostly done when the conifers are dormant. It is practically non-toxic to birds and mammals and bees. It has not been tested for effects in terrestrial animals. It is no more than slightly toxic to fish and practically non-toxic to aquatic invertebrate animals. It does not build up in fish. Studies by Mitchell, Chapman & Long (1987) concluded that "*Roundup and Rodeo herbicides would be considered to be slightly toxic and practically non-toxic respectively to trout and salmon species.*" A study by Wan (1984) concluded that there was a wide variety of effects seen on salmonid species depending on the hardness or softness of water. For chronic toxicity concerns, the EPA has concluded that glyphosate should be classified as a compound with evidence of non-carcinogenicity for humans. Laboratory studies with glyphosate in pregnant rats at dose levels up to 3500 mg/kg per day, and rabbits at dose levels up to 350 mg/kg per day, indicated no evidence of teratology. A three-generation reproduction study in rats did not show any adverse effects on fertility or reproduction at doses up to 30 mg/kg per day. Glyphosate was reported to be negative in tests for mutagenicity, however, it is noted that Clements, Ralph, and Petras (1997) found DNA changes to bullfrog tadpoles at a concentration of 6.75 mg/l, stressing the importance of keeping the product out of bodies of water in accordance to label restrictions. For acute toxicity concerns, in tests in rats, the acute oral LD50 was 4320 mg/kg of body weight, putting it in Category III, or next to the lowest in concern. The acute dermal toxicity LD50 was equal to or greater than 794 mg/kg in female rabbits and 5010 mg/kg in male rabbits, putting it in Category III. As a primary irritation for skin, glyphosate was not an irritant in tests with rabbits, putting it in Category IV. Glyphosate was a mild eye irritant in Category III. For acute inhalation, this study was waved by EPA based on the results of the other studies. There are no reported cases of long-term health effects in humans due to glyphosate. Most short term incidents in humans have involved skin or eye irritation in workers after exposure during mixing, loading or application or have reported cases of nausea and dizziness. Swallowing the Roundup formulation caused mouth and throat irritation, stomach pain, vomiting, low blood pressure and in some cases, death. These effects have only occurred when the concentrate was accidentally or intentionally swallowed in amounts averaging about half a cup and not as a result of the proper use of Roundup. According to label restrictions, glyphosate is not to be applied directly to water or wetlands. Typically in forestland uses, roundup is applied to individual weed species that are in competition with growing seedlings, but may also be used in a broadcast spray over the top of planted seedlings when they are dormant to control competing vegetation. Once tree seedlings have control of the site, it is no longer necessary to use this product in the approximately 50 year rotation period of the stand. Site control is usually reached within the first 4 to 5 years after planting depending on the spacing and survival rate of tree seedlings. In a water quality monitoring report done on the Stanislaus NF (USFS 1995, 1996, Selected Excerpts), sampling for glyphosate was done following a reforestation project.

The report states that, "*The project EIS predicted that glyphosate would not be detected in water or streambed sediment based on its environmental behavior and from monitoring results on similar projects on the Stanislaus and other national forests in California. Project monitoring results from intensive sampling in 1995 plus sampling in 1996 validated these predictions.*" (Surface Water, Ground Water and Soil Monitoring Report Hamm-Hasloe Reforestation Project, Stanislaus National Forest by Ellsworth and Grinn, 1996). Given the scientific and toxicological information in conjunction with the speculative information that the Department has with respect to the timing, amount of product, weather conditions at the time of application, or even if the product would be used at all, CAL FIRE finds that there is no substantial evidence that glyphosate use would be a significant human health hazard or significant adverse environmental impact when used in accordance to label or other regulatory restrictions and when used in reforestation in the typical manner.

For atrazine, the United Nations Environmental Programme (UNEP) does not list atrazine as a persistent organic pollutant (current as of February 2002 and not expected to change in the near future); the World Health Organization (WHO) Acute Hazard Rating for atrazine is "Unlikely to present acute hazard in normal use". Atrazine is registered for use in 13 African Countries, India, Australia, New Zealand, Philippines, United Kingdom, Portugal, Hungary, Canada and the United States. Only about 303 pounds were used in Calaveras County in 2006 on less than 100 acres. The following uses; corn (non-forage), sudangrass and bermudagrass for forage (animal feed) accounted for 63% of the use in California in 2006.

http://www.pesticideinfo.org/Detail_ChemReg.jsp?Rec_Id=PC35042)

For atrazine, the product is registered in forestry, rangeland, and right-of-way uses. It is used to control grasses and broadleaf weeds and the mode of action is by adsorption by roots and leaves of plants. It moves up through the plant and builds up in the margin of the leaves and acts by inhibiting photosynthesis in plants. Plants which are killed by atrazine do not metabolize the chemical, while plants that are tolerant are able to metabolize atrazine to hydroxyatrazine and amino acid conjugates. Atrazine is applied before or after plant growth begins, but after growth begins, it should be applied when weeds are young and active and only about 1.5 inches tall. Atrazine is active in the soil for about 5 to 7 months. Atrazine is adsorbed by soils, but how much depends on the type of soil. Under certain soil conditions, it may not stay adsorbed. Atrazine persists longer under cold and dry soil conditions. Eventually, soil microorganisms break it down and sunlight may also break it down to a small degree. Detectable amounts of atrazine are usually not found below the upper foot of soil. The main breakdown product of atrazine in the soil is hydroxyatrazine, which does not move easily in the soil. Deisopropylated atrazine and deethylated atrazine have also been found. Atrazine does dissolve in water and can move easily in soil. Occurrences of ground water problems are related to sandy soils in areas that have been identified by the CalEPA as Pesticide Management Zones and there are restrictions for use of the product in those identified zones. Other concerns related to atrazine use come from runoff or loading situations where the product has access to wellheads. These groundwater readings are primarily in areas where atrazine has been used repeatedly on crops that are annually grown. Forestland use of atrazine does not follow this use pattern because it is normally used only once or twice in the 50 year rotation age of trees and is used prior to the time that

the conifers gain control of the site and shade out grass and weed species. Because of the potential for groundwater transportation, the label restriction (EPA 100-497) states that users are not advised to apply atrazine to sand and loamy sand soils where the ground water is close to the surface and where these soils are very well-drained. The product is not to be applied directly to water or wetlands and it is not to be applied where runoff is likely to occur. Atrazine can be used for control of annual broadleaf and grass weeds prior to transplanting conifer seedlings or after transplanting or in established conifers, but should be applied when trees are dormant. It typically is not used on a frequent basis in the production of conifers since it can buildup in the soil and cause damage to growing conifers. Atrazine is moderately to slightly toxic to fish and can build up in fish to a small degree. It is slightly toxic to amphibian eggs and tadpoles. It is slightly toxic to almost non-toxic to birds. The toxicity to mammals is low. It is practically non-toxic to bees. As for chronic toxicity, atrazine was not found to be carcinogenic in an 18 month laboratory study in mice at 82 ppm in the diet. In a laboratory study in pregnant rats fed a diet including up to 1,000 ppm, atrazine indicated no evidence of teratology. Most laboratory tests for mutangenicity were negative, although a study by Clements, Ralph, and Petras (1997) showed DNA damage to bullfrog tadpoles from atrazine at a level of 4.81 mg/l, stressing the importance of keeping atrazine out of and away from bodies of water in accordance to label use restrictions. A laboratory study recently attributed to Tyrone Hayes et al of the University of California, Berkeley, on African clawed frog larvae from hatching until metamorphosis, showed that, in atrazine doses as low as 1 ppb, twenty percent of dosed males developed into hermaphrodites. Atrazine, however, at these levels did not affect mortality, developmental rates, or time to metamorphosis in the experiment. Apparently field observations of this same effect have been noted in Iowa, Nebraska and Illinois (presumably in annual cropland use) in male Leopard frogs, although there was no such finding in Utah or Wyoming. It is not known from the study if there was any such occurrence found in frog's native to California or in the Sierra Nevada. It is also not known if this effect would have significant implications for the population numbers of any particular species of frog. The study is of concern, however, and should be subject to further analysis by DPA and EPA in terms of deciding if the current registration for atrazine is appropriate or if changes need to be made in either application rates, amounts or timing of application or in terms of buffers from water sources. In the meantime, CAL FIRE has found that the normal watercourse and lake protection zone buffers in combination with the fact that the product is not used in forestry applications with the repeated frequency found in annual croplands would provide protections for water borne amphibians and there is no indication at this time that there would be significant adverse impacts to any particular species as a result of the findings made in this report.

As for acute toxicity of atrazine, in tests in rats, the acute oral LD50 was 2,850 mg/kg of body weight, putting it in Category III or oral toxicity which is next to the lowest category. The acute dermal LD50 was 7550 mg/kg in rabbits, putting it in Category III. In laboratory tests in rabbits, atrazine was not an irritant to skin. However, in tests in rabbits, atrazine was an eye irritant in Category II, or next to the highest category for eye irritation. In inhalation tests, atrazine was found to have a LC50 greater than 167 milligrams per liter for one hour, putting it in Category IV as having no irritation. For human health effects, no adverse effects have been reported in man and no long term effects have been reported in

man. Coming into contact with plants that have just been treated with atrazine and eating treated berries could cause some ill effects. The biggest concern with use seems to be with concentrations in aquatic communities. The EPA initiated use examinations for atrazine in 1994, and has issued preliminary ecological risk assessment that shows some research concluding that risk of using atrazine exceeds benefits for some aquatic communities. Most of the citations in the document involve use in annual croplands such as corn, cotton, sorghum and sugar cane, and impacts on adjacent aquatic communities in ponds. The review could result regulations that might include larger buffer zones to protect water sources, reduced amounts of the material per acre on a one-time application rate or over cumulatively over time, considerations in the timing of application as associated with precipitation events or other further restrictions on the use of atrazine. Given the scientific and toxicological information in conjunction with the speculative information that the Department has with respect to the timing, amount of product, weather conditions at the time of application, or even if the product would be used at all, CAL FIRE finds that there is no substantial evidence that atrazine use would be provide a significant human health hazard or significant adverse environmental impact when used in accordance to label and other regulatory restrictions and when used in reforestation in the typical manner that involves buffers from water sources and infrequent use over the 50-year Forest Practice Rule (FPR) minimum rotation age of a crop of trees. Statewide sales of atrazine in 2005 were about 45,000 pounds

For triclopyr, the United Nations Environmental Programme (UNEP) does not list triclopyr as a persistent organic pollutant (current as of February 2002 and not expected to change in the near future). It is registered for use in 10 African countries, New Zealand, Philippines, Germany, Hungary, Netherlands, Portugal, United Kingdom, Canada and the United States. Statewide the butoxyethyl ester formulation was reported in 2006 to be used mostly for landscaping and right-of-way uses, with less than 20% used in forestry applications. The vast majority of the triethylamine salt formulation was used for the cultivation of rice in 2006, with less than 2% used in forestry applications. Only about 515 pounds were used in Calaveras County for forestland treatment in 2006. This is but a fraction of the amount used statewide on forestlands. Other formulations of triclopyr were not reported among the top 50 pesticides used statewide in California in 2006.
(http://www.pesticideinfo.org/Detail_ChemReg.jsp?Rec_Id=PC36359)

For triclopyr, also known as Garlon, the product controls woody plants and broadleaf weeds forestland, rangeland and permanent grass pastures. It acts by disturbing plant growth and it is absorbed by green bark, leaves and roots and moves throughout the plant. It accumulates in the meristem region of the plant. Triclopyr is active in the soil and is adsorbed by clay particles and organic matter in the soil. Microorganisms degrade triclopyr rapidly with the average half-life being 46 days. The potential for leaching depends on the soil type, acidity and rainfall. It should not be a leaching problem under normal conditions since it binds to clay and organic matter in the soil. It may leach from light soils if rainfall is very heavy. Sunlight breaks down triclopyr rapidly in water in less than 24 hours. It is slightly toxic to practically non-toxic to soil microorganisms and low in toxicity to fish. Triclopyr does not accumulate in fish and is slightly toxic to practically non-toxic to invertebrates. It has not been tested for chronic effects in aquatic animals. However, a

report by Wan, Moul and Watts (1987) indicated that "*under field conditions, the concentrations of Garlon 3A in a stream unintentionally oversprayed during an aerial operation would not likely exceed a level greater than 10 mg/L in 15 cm of water even at the highest rate of application. The potential of this product causing fish kill is therefore small when used under prescribed conditions.*" Pesticide use reporting data from SPI indicate that Garlon 3A is the primary formulation used by the company in its reforestation efforts. Triclopyr is slightly toxic to mammals, but most triclopyr is excreted, unchanged, in the urine. It has not been tested for effects to terrestrial animals. As for chronic toxicity considerations, laboratory tests in mice and rats fed up to 30 mg/kg per day for 2 years did not show any evidence of carcinogenicity. Tests in pregnant rats indicated no evidence of teratology. A three-generation reproduction study in rats did not show any adverse effects on fertility or reproduction at doses up to 30 mg/kg per day. It was negative in several tests for mutagenicity. For acute toxicity considerations, in tests in rats, the acute oral LD50 was 630 to 729 mg/kg of body weight, putting it in Category III, or next to the lowest category. The acute dermal LD50 was greater than 2000 mg/kg in rabbits, also Category III. Triclopyr was a slight to moderate irritant in Category III to IV. In laboratory tests in rabbits, triclopyr was a slight eye irritant in Category III. In laboratory tests in rats, exposure to 5.34 ppm for one hour caused no adverse inhalation effects, putting it in Category III. There are no reported long-term or short-term human health effects. It is not to be applied directly to water according to EPA label restrictions. (EPA 352-378) Triclopyr in forestland use would not be likely to be used more than once or twice in the rotation age of a conifer plantation since growing conifers would be able to get control of the site rapidly to shade out weed and grass species. Pines especially are damaged by triclopyr, so once pines are planted, overspray of the product would not be a typical application. A ground spray of the product directed away from pine seedlings might be possible however following tree planting. Given the scientific and toxicological information in conjunction with the information that the Department has with respect to the timing, amount of product, weather conditions at the time of application, or even if the product would be used at all, CAL FIRE finds that there is no substantial evidence that triclopyr use would be provide a significant human health hazard or significant adverse environmental impact when used in accordance to label or other regulatory restrictions and when used in reforestation in the typical manner.

For hexazinone, the product name is often known as Velpar or Pronone. About 1400 pounds were used in Calaveras County on forestlands in 2006. This compares to about 116,000 pounds were sold statewide in 2006 for all uses. It is used for control of broadleaf weeds, grasses and woody plants in the growing of conifers. It inhibits photosynthesis and is readily adsorbed through leaves and roots and moves in an upward direction through the plant. It is not to be applied to saturated soils. Hexazinone may remain active in the soil at low concentrations for up to three years after application. It is only minimally adsorbed to soil but is highly adsorbed to the leaf litter layer. It will release carbon dioxide upon breakdown. No information is available on the possible effects on the environment or other metabolites of hexazinone found in the soil. It could contaminate groundwater; however, some research has indicated that it is not likely to leach beyond the root zone. While other research has indicated its ability to extend beyond the root zone, even if found in water, it does apparently degrade rapidly in natural waters. EPA studies indicate hexazinone "appears to be persistent and mobile in soil and aquatic environments" and "may be of

concern for both groundwater and surface water contamination" (EPA, 1994). Recommended rates of the product on a per acre basis was adjusted downward to increase the margin of safety in using the product based on conclusions in the study. It is not toxic to fungi, bacteria or other soil microorganisms at registered use rates. It is highly toxic to non-target plants, however. It is practically nontoxic to fish, freshwater invertebrates and mollusks and is slightly toxic to crustaceans. No studies have been reported for amphibians or aquatic organisms. It is practically nontoxic to birds and insects. Toxicity to mammals is also minimal. For chronic toxicity considerations, in laboratory tests with male and female rats, hexazinone was not an oncogen up to the highest dose tested. Tests with pregnant rats indicated no evidence of teratology. A three-generation rat study indicated no evidence of reproductive effects except for decreased weight of rats fed at the highest dose tested. The EPA concluded that hexazinone is not a mutagen. For acute toxicity considerations, in tests in rats, the acute oral LD50 of hexazinone was 1690 mg/kg of body weight, which puts it in a Category III, or next to the lowest category of concern. The acute dermal toxicity has an LD50 or 5278 mg/kg in rabbits tested, or Category IV, the lowest category. Hexazinone was a low-level irritant in Category IV as well. However, hexazinone was a severe eye irritant in Category I and as a result there are label restrictions for eye protection for handlers of the chemical and for applicators. In laboratory tests in rats, the acute inhalation LC50 was 7.48 mg/l, putting it in the lowest Category IV as a nonirritant. There are no reported cases of long-term health effects to humans and it has not been reported to have caused any deaths or hospitalized cases, although there is one report of vomiting after 24 hours after inhalation of hexazinone dust. Hexazinone is not to be applied directly to water or wetlands or where runoff is likely to occur (EPA 352-581). Grazing of animals on areas treated by hexazinone should not be done within 30 days after treatment to avoid residues of hexazinone in meat or milk. In forestland situations, it is typically used for release of planted conifers and because of its lasting effects on weed species, it is not usually needed more than once or twice in the 50 year FPR minimum rotation life of the planted conifers as the young trees will quickly gain control of the site and shade out the weed species. In water quality sampling done after application of the material by the USFS, (USFS 1995, 1996, Selected Excerpts), there was a finding on the El Dorado National Forest that *"The highest level of hexazinone detected in this monitoring effort was 19 ppb. The concentrations of hexazinone detected in all water samples are below the level used to predict human consumption risk in the FEIS. The levels were 10 to 200 times less than the EPA Lifetime Health Advisory level for hexazinone, which is 200 ppb. The EPA believes that water containing hexazinone at or below this level is acceptable for drinking every day over the course of one's lifetime (USEPA, 1988). This highest concentration detected is less than 0.06% of the concentration that would be needed to fall within the range of the Q-value for the most sensitive known species."* (abstract of Water Quality Monitoring Report, 1992 Herbicide Application Projects, ENF by Fiore, Christiansen, and Bakke 1995) However, another water quality monitoring report done by the USFS on the Stanislaus National Forest stated levels of hexazinone as high as 600 ppb. But, as stated in the report, *"All hexazinone sampling results were in the predicted range except at the site where quantities exceeded 100 ppb. A review of that site was conducted which indicated that the probable causes were* ***shallow soil conditions and herbicide misapplication.***" (emphasis added). The report went on to state that, "*Hexazinone quantities detected met federal and state water quality objectives for beneficial uses of water. The short term exceedence of 200 ppb*

at MO-T2 did not compromise the EPA lifetime human health advisory since it did not represent a chronic occurrence. Aquatic life was not adversely affected since the maximum quantity detected is less than the acute toxicity to fish, amphibian, stream insects and algae. Hexazinone quantities detected at nine of the 10 sites monitored were acceptable as deminimus concentrations. The site review of timber stand 27-21 (monitored by MO-T2) indicated that adjusting herbicide application methods at such sites will likely reduce hexazinone detection to the minimum technically feasible." (Surface Water, Ground Water and Soil Monitoring Report Hamm-Hasloe Reforestation Project, Stanislaus National Forest by Ellsworth and Grinn, 1996). In yet another water quality monitoring report on the Stanislaus NF, the abstract summarized that "*Hexazinone was sampled in surface and ground water and was detected in surface water in quantities ranging from .2 to 43 ppb. Hexazinone was not detected in groundwater." "State and federal water quality objectives for pesticide use were met".* (Water Quality Monitoring Herbicide Application Paper Reforestation Project, Stanislaus NF, by Apperson and DeGraff, 1996) Given the scientific and toxicological information, along with sample water quality monitoring data from USFS reports from the central Sierra Nevada for reforestation projects, in conjunction with the information that the Department has with respect to the timing, amount of product, weather conditions at the time of application, or even if the product would be used at all, CAL FIRE finds that there is no substantial evidence that hexazinone use would be provide a significant human health hazard or significant adverse environmental impact when used in accordance to label or other regulatory restrictions and when used in reforestation in the typical manner.

Biological effects of herbicide use can vary depending on the number of applications and the timing of the applications, but generally, CAL FIRE field observations would indicate that none of these materials are 100% effective in eliminating brush, forbs or weeds. All the products have labeled vegetation where the material is effective, but even a total elimination of these labeled species is not typically gained, although there may be stunting of the growth of some of these species for a time. Certainly, it could be expected that there would be a reduction of herbs, grasses and forbs for a number of years when compared to an area cleared by fire or mechanical means where no brush control methods were used at all. That can be expected since the purpose of the product is to reduce competition for sunlight, water and nutrients in order for planted conifers to gain a foothold and begin to grow. The real question is, would one expect to get more herbs, forbs and grasses in a closed canopy forest where there is no vegetation manipulation compared to a harvested area where brush control was employed? It would also be expected that damage could occur to endangered plant species that were sprayed by herbicide products and that stresses the importance of scoping, examining literature sources and survey for endangered plants if the first two processes indicate the potential for occurrence of endangered plant species within blocks of harvested timberland that are likely to be sprayed with herbicides. Except for atrazine, these products do not have much effect on seeds of brush, forbs or other species so that there can be reseeding of these species within a period of time. Atrazine has an effect on seeds for a while, but will break down over time and the remaining seed bank in storage in the soil or seeds blowing in from other areas will be available to regenerate the various species. Since the even-aged regeneration units are spaced out over time and over the area in accordance with BOF rules, other units that have brush, forb or weed growth will be

available nearby so that there is not a total elimination of a variety of species useful for wildlife habitat and forage on any large landscape basis. As stated previously, the purpose of herbicide use on these forestlands is not to eliminate brush, forb and weed species, but rather it is needed to give the tree seedlings an opportunity to outgrow the competition and get up to a superior height were the trees are able to control the site by the natural process of dominating available sunlight. Observation over time by CAL FIRE inspectors finds that older plantations show a wide diversity of grasses forbs and shrubs indicating that the use of herbicides does not eliminate these plants. As stated in the THP published research by UC Davis researchers found increased plant diversity in herbicide treated areas. (DeTomaso, 1997)

Several studies have focused on the apparent reduction of populations of amphibians in the Sierra Nevada that has been evident in recent years and the potential for agricultural use of chemicals to be implicated. A report by Carey & Bryant on the reduction of amphibian populations throughout the world, theorized that "*It is likely that no single factor or group of factors has been the causative agent through the world; each locality may have its own particular cause or causes*" and "*in most cases, causes of amphibian population declines are unknown.*" Another study done locally on amphibian populations in California by Davidson, Shaffer and Jennings (2001) indicated "*However, to date, there has been no direct evidence linking pesticides to amphibian population declines.*" This report attempt to suggest that wind borne agrochemicals in general may be a factor in contributing to the decline of red-legged frogs in the Sierra Nevada. However, there is nothing in the report that would assist in evaluating the potential impacts of any particular chemical, type or rate of application or distance between pesticide application and the subject amphibian population. The report examines a statistical way of testing four hypotheses that were considered by the authors to be likely culprits in the reported decline of red-legged frog species in California. The report did not attempt to relate any of the findings in the California situation with the reported world-wide decline of other amphibian species. As an example, the theory of pesticide drift from agricultural areas of the San Joaquin Valley being causal for red-legged frog decline may or may not hold up when compared to other areas of the world where other amphibian species decline is reported, but where there may not be intensive agricultural use of pesticides. Additionally, the report did not test some other hypothesis, such as the potential for air pollution to be a suspect in the process. ("*We analyzed the climate change, UV-B, pesticides, and habitat destruction hypotheses, because each has distinct implications for spatial patterns of declines.*)" Finally, it is noted that nothing in the report concludes that the use of herbicides are problematical in the alleged decline of red-legged frog vs. the effects of fumigants, nematicides, or insecticides and any of the numerous other pesticides that are used in the San Joaquin Valley. In fact, the report cites several studies which have reported pesticide depositions in the Sierra Nevada, all of which chemicals turn out to be insecticides rather than herbicides. ("*However, a number of studies for the Sierra Nevada have documented the transport and deposition of pesticides originating in the Central Valley. Zabik and Sieber (1993) found organophosphate pesticide residues (chlorpyrifos, diazanon, and parathion) in wintertime air and precipitation samples from sites at 533 m and 1920 m elevations in Sequoia national Park in the southern Sierra Nevada. They found that quantities of pesticides decreased with increased distance and elevation from agricultural lands in the Central Valley floor". "At*

other sites, McConnell et al (1998) found organophosphate pesticides in winter and spring rain and snow both in the southern Sierra and further north in the Lake Tahoe region." "Pesticides have been found in the bodies of frogs and fish in the Sierra Nevada, beginning with Cory et al's (1970) finding of DDT residues in the bodies of mountain yellow-legged frogs (Rana muscosa) throughout the Sierra. More recently, Datta et al (1998) found PCBs and organophosphate pesticides in the bodies of trout and the Pacific treefrog (Hyla regilla) tadpoles from the southern Sierra Nevada.") A report by Sparling, et al 2000) also identified insecticides in the bodies of tadpoles in the Sierra Nevada Mountains adjacent to the San Joaquin Valley. The analysis of amphibians in this report develops evidence for the theory that pesticide drift from insecticides that may be used in San Joaquin Valley agriculture are a factor in the decline of amphibian species in the Sierra Nevada. Among chemicals with measurable concentrations were "*chlorpyrifos, malathion, diazinon...*". A report by Calumpang et al (1997) also measured the effects of several insecticides in rice paddy water that was allowed to overflow into water inhabited by various fish and frogs. However, again, the report measured the effects of specific insecticides and not herbicides that are actually being used on SPI lands. Nothing in the report is specific to the situation being reviewed as the subject of this Official Response. A report by Bishop, C (1997) suggested "*more research was needed on the effects of pesticides under field conditions suing native species in order to determine the extent to which environmental contamination contributes to declines in amphibian populations.*" A report by Berrill, M et al (1994) indicated that *"a buffer zone around large water bodies is usually left unsprayed, and sites are contaminated only by unintended spray drift.*" However, the report was concerned with small lakes and ponds that may not be protected from contamination so that eggs and tadpoles are likely to be exposed to low concentrations of sprayed chemicals. The report examined Canadian frog species which, except for the introduced bullfrog species, are not of concern in the Sierra, and concluded that there are small, but important differences between the species tested and differences in the timing of the spray as it coincides with the developmental periods of frog species.

A recent study was published by Davidson & Knapp (2007) on the *Multiple Stressors and Amphibian Declines: Dual Impacts of Pesticides and Fish on Yellow-Legged Frogs.* This study attempted to correlate the lack of yellow-legged frog populations with the presence of introduced fish species as well as the patterns of wind borne pollutants from the central valley of California. The studies were done in Yosemite National Park and also Sequoia-Kings Canyon and the John Muir Wilderness area in between the parks. The study was apparently done in an area that would be most downwind and affected by chemical drift from Kings, Kern, Fresno, Madera and Tulare Counties. These counties account for a substantial percentage of the chemicals used in California for agricultural purposes. It is not clear from the study if the same results would have been obtained in the area of the Stanislaus River as this area is downwind from counties that would typically use substantially less chemicals in agriculture than was used in the study area and clearly have different wind patterns being more exposed to the gap in the coast range mountains through the San Francisco Bay area. Additionally, the study only focused on the mountain yellow-legged frog, which typically occurs at an elevation higher than that which is found on this particular THP area. One of the conclusions of the study is that "*Our finding that both fish and pesticides are associated with declines strongly supports the need for additional*

multi-factor studies." The regulations of the Board of Forestry and Fire Protection in Technical Rule Addendum No. 2 state "*The RPF preparing a THP shall conduct an assessment based on information that is reasonably available before submission of the THP.*" The language of the study would indicate that additional multi-factor studies are needed to determine the reason for declines of amphibians. There is nothing in the study that would indicate which of the hundreds of chemical combinations was more of a problem in the population studies of mountain yellow-legged frogs. Other studies (Davidson 2004) found that "*declines were more strongly associated with cholinesterase-inhibiting pesticides (mostly organophosphates and carbamates) than with total pesticide use or any other class or group of pesticides.*" Neither of these classes of insecticides is proposed for use on this particular THP that is the subject of this Official Response. It is also clear that the pattern of use of herbicides on a THP project is different than that which would be typical for agriculture use. Agriculture use of pesticides can occur multiple times within one season and cover large unbroken areas of land, often under conditions of high temperature where volatility of the product more of a problem. As typically used in artificial regeneration of conifer crops, chemical use is infrequent at one or two occasions during a 50 to 80 year rotation on separated units that average around 20 acres in size and is done under cooler conditions given the elevations involved.

With respect to the role of pesticide drift affects to amphibians, another more recent study comes from Roland Knapp (2007). This study focused on the role of chytridiomycosis disease on populations of Rana muscosa and Rana sierrae. From a summary of the report in http://www.mylfrog.info/threats/contaminants.html , "*In California, winds generally blow through the Central Valley and then eastward across the Sierra Nevada, and detectable (but very low) concentrations of several agricultural chemicals have been detected in the Sierra Nevada, including in mountain yellow-legged frogs from high elevations (Fellers et al.2004). Consistent with the hypothesis that pesticides are negatively affecting amphibians, recent studies have reported that the probability of extinction for mountain yellow-legged frog populations is positively correlated with the amount of agricultural land use upwind (Davidson et al. 2002) and the amount of pesticides applied upwind (Davidson 2004; Davidson and Knapp 2007). In addition, numerous reintroductions of Rana muscosa into historically-occupied habitat in the southwestern Sierra Nevada (Tablelands area of Sequoia National Park) have failed, perhaps due to the relatively high concentrations of pesticides characteristic of this area due to its proximity to the southern San Joaquin Valley (Fellers et al. 2007). A shortcoming of all these studies is the inability to distinguish between effects caused by pesticides and those caused by chytridiomycosis. The commonly-reported pattern of mountain yellow-legged frog disappearances in the western Sierra Nevada close to the Central Valley and their continued existence in more eastern localities has generally been attributed to the exposure of western Sierra Nevada populations to higher pesticide concentrations. However, this pattern is also entirely consistent with the amphibian chytrid fungus (Batrachochytrium dendrobatidis) spreading across the Sierra Nevada from west to east, and several observations suggest the overriding role of chytridiomycosis relative to pesticides causing the decline of the mountain yellow-legged frog. The most important of these is the recent B. dendrobatidis-caused die-off of hundreds of mountain yellow-legged frog populations in areas of the Sierra Nevada that are remote from the Central Valley and that are subjected to only very low pesticide concentrations.*"

Another review of this study (Roland Knapp 2007) comes from www.sciencedaily.com/releases/2007/08/070806203309.htm. In this report it states "*Biologists are still determining exactly how this fungus, first identified in 1998, kills the amphibians it infects, but most believe that the pathogen disrupts the frog's ability to absorb water through its skin.*" And "*The findings could help explain the global spread of this pathogen, which has also been found in South America, Australia, Europe and Africa, aid the researchers. While human-caused spread is possible, the fungus has infected amphibians in pristine areas too remote for human activity.*" This document also states that "*The genotype of our fungi in the Sierra are not that different from genotypes found around the world..*" and "*That means there must be someplace else on earth where this fungus is endemic. One would guess that the frogs living where the ancestral population of this fungus is located would not be affected that badly. We could then try to determine the mechanisms those frogs use to resist the pathogen.*"

From another report on the study in www.CaliforniaFarmer.com (Feb 2008), "*This group of fungi can produce spores which last decades, said John Taylor, UC Berkeley professor of plant and microbial biology. As resistant spore, the fungus could be transported by animals, including humans or birds, or lay dormant in an infected area until a new host comes along.*" CAL FIRE finds that the implication of this study as reported in the sources listed in the three paragraphs above places question on the role of pesticide drift on populations of amphibians, and more information is needed.

Regarding the statement that indicates the THP states that herbicides will only be used once or twice in the planted area the THP states on page 102 that herbicides may be used "...*on average once or twice on any given forest acre, over a period of 50 to 80 years*". This does not seem to be an unreasonable assumption for SPI lands where a portion of silviculture is in even-age regeneration methods and where part of most every THP is in methods that do not require site preparation or planting. Therefore, the inference is that, where there is even-age plantation management, those acres could have, for example, three applications of herbicides while other areas where there is no site preparation and planting would not be expected to have any herbicide application. This is not inconsistent with SPI stating that herbicides could be used "*an average of once or twice on any given forest acre*" taking into account the sum total of acres that have even-age plus uneven-age silviculture treatments.

In Calaveras County in 2006 the top use of pesticides was forest related, although very high use was also reported in landscape maintenance and right-of way application. Forests by contrast accounted for about 25%, but with an application rate per acre of less than that for many agricultural communities. Due to the location of the assessment area for this particular project which is the subject of this Official Response, other non-forestland applications are not likely to interact with applications made to the regeneration areas for this THP to create significant adverse individual or cumulative impacts. Within the assessment area, there are no substantial areas where agricultural crops are grown or farmed and there are no substantially sized urban locations where lawn and garden chemical products would be used. While there could be some limited use of chemicals for

right-of-way maintenance, the areas along the paved roads are largely timbered and shaded and do not have a brush control problem that would indicate the use of repeated chemical applications.

9. **Concern:** There was a concern that this THP does not adequately analyze cumulative impacts or propose appropriate mitigation measures to compensate for the cumulative impacts that will be generated by this project if it gains approval. The THP authors attempt to show that no significant harm will come to the environment as a result of the currently proposed, past, and future projects in the area. However, this document does not provide any such assurance that aggressive, mechanized logging on @400 acres in the midst of thousands of acres of past and future logging treatments can all be done without causing any significant effect on Special Status wildlife and plants or without degrading watershed quality. On top of the all the cumulative impact concerns already described in this comment letter, our Center continues to point out that the THP fails to provide any detailed cumulative effects analysis that looks at how much clearing SPI has already done within the watershed or across the local region, how much unevenage, diverse forest habitat has been converted into sterile uniform tree presentations, how much older forest habitat has been lost in the last decade, or other such important questions for those seeking to be informed about consequences. As we have shared repeatedly, CSERC asserts that SPI continues to fail to provide accurate and important information in its THPs concerning the cumulative impacts of its even age logging treatments on the biological resources of the affected watersheds and habitat. It is one thing for SPI to provide the same, tired generic information claiming that what they do only affects a small percent of the overall Sierra Nevada region. It is quite another thing for SPI to provide a level of detail that would show exactly how many even age/clearcut acres have been stripped of vegetation within the watershed or within a forest block surrounding this THP project area. If projects are only looked at in terms of a vast scale, such as the world as a whole, no project would ever be found to have a significant. The purpose of analysis for cumulative impacts, however, is to look at the appropriate scale for the various species that are most at-risk from the cumulative impacts of the proposed action. If a developer was attempting to satisfy CEQA for a development project, that analysis would require the consideration of all relative past, present, and foreseeable future projects that, when combined with the proposed project, affect resources. SPI should be held to the same standard in this THP.

Response: The rules of the BOF state that "*Cumulative impacts shall be assessed based upon the methodology described in the Board Technical Rule Addendum Number 2, Forest Practice Cumulative Impacts Assessment Process and shall be guided by standards of practicality and reasonableness. The RPF's and plan submitter's duties under this section shall be limited to closely related past, present and reasonably foreseeable probable future projects within the same ownership and to matters of public record.*" The contents of the THP clearly show that this methodology was used by the plan submitter's RPF. The plan lists those past, present and probable future projects. The plan extensively uses the

Technical Rule Addendum methodology to analyze the current conditions of the watershed, biological and soil resources, and impacts to traffic, visual and recreational uses of the area. The plan identifies a watershed assessment area of a fourth order watershed as specified by the BOF as being the best sized assessment area to be able to find the potential for adverse cumulative impacts. The plan also identifies a separate sized area in which to identify impacts to the biological community given the increased mobility of some animal species.

Technical Rule Addendum No. 2 further states that "*The Department, as lead agency, shall make the final determination regarding assessment sufficiency and the presence or absence of significant cumulative impacts.*" As such, CAL FIRE has made a determination that the plan contains the elements necessary for the Department to review the potential for significant adverse cumulative impacts.

In order for the Department to be able to deny a THP, the rules of the BOF prescribe certain conditions as authority for the Department to act. 14 CCR Section 898.1 requires denial of THPs which do not incorporate procedures that will substantial lessen significant adverse impacts on the environment. The plan, however, as written, reviewed and mitigated did not result in a finding of significant adverse impacts. Another reason for denial would be for plans that did not meet the requirements of individual BOF rules. However, the plan as written, reviewed and mitigated met the rule requirement of the BOF. There are also a few special conditions to deny plan found in 14 CCR Section 898.2, and these include that boundaries of the plan are not clearly delineated; public acquisition of the parcel is funded and imminent; evidence that the plan is materially incorrect, incomplete or misleading; the plan would result in a "taking" or finding of jeopardy to a rare, threatened or endangered species; the plan would result in irreparable damage to listed plant species; the plan would result in a taking of Northern Spotted Owl; the plan would not achieve maximum sustained production of high quality timber products; or, the plan would cause a violation of the water quality control plan. None of these conditions exist in respect to the THP project as outlined in THP 4-08-005/CAL-1. CAL FIRE did not find that the THP met one of the conditions for denial as specified in the BOF regulations.

10. **Concern:** There was a request for the 2007 study by SPI stating that it, "was compiling results from an in-house plantation diversity study."

Response: The RPF removed this reference from the THP. The study has not been published and can not be used by CAL FIRE for evaluation. The THP does reference the following publication (THP, p.114.10):

DiTomaso, Joseph M., et al. 1997. Post-fire herbicide sprays enhance native plant diversity. California Agriculture 51(1):6-11

CAL FIRE used this publication in evaluating the THP. This publication's summary states:

> *"Following catastrophic fire, broad-spectrum herbicides such as hexazinone are often used to control shrubs and forbs that compete with planted conifers. This practice encourages rapid growth and reduces and reduces mortality of conifers. Although the initial effect is to reduce native plant species richness, recovery is*

rapid and plant diversity exceeds that in untreated areas within 8 years of application. Success of native forb and grass species in herbicide-treated areas appears to be due to early suppression of otherwise dominant shrubs."

CAL FIRE concludes there is no reason to wait for the publication of the referenced in-house biodiversity study.

11. **Concern:** There was a concern that the THP did not contain information required by the DFG for drafting water and that any locations on USFS lands should also be shown as a part of the THP.

Response: The DFG is responsible for approving the drafting locations and a field check is typically done by a representative of that Department in order to insure that the waterhole locations would not impair streamflow that would be needed for fisheries or wildlife and would not impair the quality and beneficial uses of water. The form included in the THP is a form sent to DFG (along with the remainder of the entire THP) and they are responsible for the contents being filled out appropriate to their needs prior to issuing a permit. During the PHI, it was discussed that the THP itself should show the locations of the drafting on a map, and this was agreed to by the RPF who prepared the THP to be done prior to approval and during the public comment period. The comment period was thus re-opened to allow this to occur. The THP on page 60 contains most of the information that was requested in relation to a description of the waterhole diversions. During the early review of the THP, DFG requested several modifications and mitigations and those that were appropriate were incorporated in the THP. Among these provisions was construction of truck pads containing rock in order to reduce sedimentation that might be associated with trucks entering close to the watercourse during drafting operations. Also, it was agreed that drafting from a pool within the watercourse would not result in reduction in pool volume to exceed 10% of said volume. Also, pump intakes will be fitted with mesh bags or screens designed to DFG specifications in order to avoid uptake of fisheries species and the water truck operators are to inspect and clean the screen before each use. Also, the velocity of water across the screen surface will not exceed .33 feet per second at any point on the screen surface and the screen will be supported so that no part of the screen will be obstructed. For off-channel waterholes, the provisions provide that the waterhole will be gravity filled only and that at no time will more than 20% of the water flow be diverted into the off channel waterhole. CAL FIRE finds that these measures and mitigations show an appropriate response to the possible impacts that can be associated with the use of waterholes and further finds that these mitigations adequately address and provide mitigations for significant adverse environmental impacts.

While the PHI does not mention any drafting locations on USFS lands, the agreement done during the PHI does state that all waterhole locations should be shown on the map and CAL FIRE is not aware that there are locations on USFS lands that are not shown. CAL FIRE would not be lead agency on activities occurring on these adjacent federal lands, but again, CAL FIRE is not aware that such locations are being utilized on federal lands for this project. In the event that federal lands are used during this activity or other THPs, the DFG

still has authority over stream diversions and the USFS would evaluate the impacts as part of their normal practice under NEPA.

12. **Concern:** There was a concern that the THP could create visual impacts from Winton Road where they are said to be clearly visible or from residences that have not been notified.

Response: Notification of adjacent landowners is required, but at a distance, there is no requirement in the rules of the BOF for direct mailed notification. However, there is notification to the general public in the form of posted notices at the location of the THP, posted notices in the local CAL FIRE Ranger Unit office, posted notices at the office of the County Clerk. There is typically additional notice in a local newspaper, although the actual purpose of the notice is for information related to domestic water use. For this THP, notice appeared in the Calaveras Enterprise on October 19, 2007. This notice could have been used by any interested party to seek additional information about this project even if it was not an issue related to use of water for domestic purposes as it contained a legal description of the location of the project and a contact number for the plan submitter. It should be noted that in spite of these forms of notification, CAL FIRE received but one concern about the visual impacts of the project.

The THP discusses the visual impacts as required by the BOF Technical Rule Addendum #2. As such the discussion recognizes that some of the even-age units will be visible from Winton Road, but that the stand openings will be partially obscured from view by topography and residual trees so that only portions of the clearcuts for this project will be visible at a low angle. It should be noted that Winton Road is certainly available to be used by the public, but is not heavily traveled relative to a major State highway in California and as such, there will not be substantial numbers of viewers. For the residences, the THP notes that there are several seasonal cabins in the area of the project where portions of units 334 and 335 may be visible and also that there is a road through unit 337 that leads to a seasonal cabin. However, there are not substantial numbers of residences in the vicinity of the project. Likewise, there might be distant views of mountains or scenery that would otherwise be blocked by roadside trees. Given that the areas will be replanted within a few years of the project and that the trees are expected to occupy the site and thus modify the view in a short time and that there are not substantial numbers of either drivers on Winton Road or residences in the area, CAL FIRE does not find that there will be a probable significant adverse or cumulative impact from this project.

13. **Concern:** There was a concern that the THP could create impacts from traffic or noise to the community or tourists and that the THP does not state whether logs will be hauled out via Highway 4 or not.

Response: The THP describes the haul route out of the project onto Winton Road, which is away from Highway 4. There is no mention in the THP of hauling on Highway 4. The routes used to the mills, to Camino, or in the Sonora area, or to Lincoln, utilize Highway 49 and roads that have been used for seasonal log hauling for decades. In fact, with the demise of broad-based logging activities on USFS lands, there has been a notable drop-off

of traditional log truck traffic relative to this area of the central Sierra Nevada. Witness to this observation is a drop-off of the number of THPs submitted to CAL FIRE as there currently are 80% fewer THPs processed in the Southern Forest District as compared to the 1980's (from CAL FIRE records). Also witness that, during the 1950's to 1970's, there were upwards of 26 full and part time lumber mills that processed logs in the Southern Forest District and that there is currently one full time and a few part time lumber mills. (partial reference from: "In Search of the Last Sugar Pine: The Sawmill History of the Southern Sierra Nevada Mountains from the 1930's to the Present by Kirby D. Molen; Morris Publishing; 2002) Winton Road itself has long been used for log hauling for many, many decades. As for the concern about noise, there are only a few part time residences that are close to the project as discussed in Concern 12 above. Noise levels from logging are typically transient as equipment and chainsaws move from one location to another and are dependent on things like distance and wind direction. There is an expectation that noise would largely occur during daylight hours, except for the first trucks arriving at the logging location in the early morning. As well, residences along the haul route would be impacted by truck noise, but as discussed above, these locations have experienced this type of disturbance for decades and the project therefore represents a continuation of the status quo. As such, CAL FIRE does not find that the project will represent a significant adverse environmental impact from traffic or noise and finds that the discussion in the THP is adequate and in conformance with the rules of the BOF.

14. **Concern:** There was a concern that THP-005 is based on SPI's nine year-old Option A Demonstration of Maximum Sustainable Production ("Option A Demonstration"), dated January 1, 1999, which has become obsolete in light of important new scientific evidence of the impacts of climate change on forest resources. Because SPI has not updated its Option A Demonstration to incorporate more recent projections of negative impacts of climate change on tree growth rates and wood volumes, SPI overestimates its Long-Term Sustained Yield ("LTSY"). As long as SPI continues to base its annual timber harvest rates on its outdated Option A Demonstration (copy attached hereto as Exhibit 1), it cannot demonstrate that its average annual yields will not exceed the rate required to "balance growth and harvest over time" as required by Forest Practice Rule 953.11, subdivision (a)(2). The proposed harvest in THP-005 is based on the 1999 Option A Demonstration and therefore fails to satisfy the requirements of Rule 953.11. A primary goal of the Forest Practice Act ("FPA") is to achieve "maximum sustained production of high quality timber products." (Pub. Resources Code, § 4513, subd. (b).) The California Department of Forestry and Fire Protection ("CDF") has a mandatory duty under the FPA "to adopt and enforce regulations which ... limit the aggregate harvest of timber on private timberlands in relation to the present and anticipated future supply of standing timber." (Redwood· Coast Watersheds Alliance v. State Bd. of Forestry and Fire Protection (1999) 70 Cal.App4th 962, 967 [quoting trial court opinion upheld on appeal].) CDF therefore has a mandatory duty to enforce Forest Practice Rule 953.11 which requires timber harvesters to demonstrate that proposed harvests will achieve maximum sustained production ("MSP") of high quality timber products through "balanced growth and harvest over time." (14 Cal. Code Regs., § 953.11, subd. (a)(2).) Timber harvest plans ("THP"), such as that at issue here, must show

that immediate proposed cuts will not impair the sustainability of predicted annual growth at the end of the planning horizon or over any 10-year rolling period. (Id.) CDF's review of THP-005 is also subject to the requirements of the California Environmenntal Quality Act ("CEQA"). (Natural Resources Defense Council, Inc. v. Arcata Nat. Corp. (1976) 59 Cal.App.3d 959,965.) Because a THP is the functional equivalent of an Environmental Impact Report ("EIR"), the same CEQA requirements which would apply to CDF' s review of an EIR apply to its review of THP-005. (Sierra Club v. State Bd. of Forestry (1994) 7 Ca1.4th 1215, 1230; Pub. Resources Code, § 21080.5.) Under CEQA, public agencies must conduct an "independent review and analysis" of the claims made in a project proponent's EIR. (Citizens to Preserve the Ojai v. County of Ventura (1985) 176 Cal. App. 3d 421,432.) When conducting this review, the agencies must base their findings on up-to-date scientific information. (Berkeley Keep Jets Over the Bay Com. v. Bd. of Port Commissioners (2001) 91 Cal.App4th 1344, 1367, 1370 [holding that a lead agency must not use "scientifically outdated information" and should make a "reasonably conscientious effort" to obtain relevant data]; Seattle Audubon Soc'y v. Espy (1993) 998 F.2d 699, 704-705 [invalidating the U.S. Forest Service's certification of an Environmental Impact Statement which rested on "stale scientific evidence"].) Thus, here, CDF has a responsibility to assess SPI's Option A Demonstration and associated THP-005 in light of current scientific assessments of the likely impacts of climate change on tree growth rates and wood volumes in California. Finally, CDF's review of SPI's Option A Demonstration and THP-005 should be guided by recent pronouncements of the United States Supreme Court as well as the state's recent policies for addressing climate change. In the event SPI argues that the effects of climate change are too uncertain to justify factoring them into its Option A Demonstration, CDF should reject such claims. In last year's Massachusetts v. EPA opinion, the U.S. Supreme Court effectively ended the legal debate over the degree of scientific certainty of climate change: the Supreme Court stated in the opinion that "[t]he harms associated with climate change are [now] serious and well recognized (Massachusetts v. EPA (2007) 127 S.Ct. 1438, 1455; see also Central Valley Chrysler-Jeep, Inc. v.Goldstone (E.D. Cai. 2007) 529 F. Supp. 2d 1151, 1169-1170.) In addition, the state has gone to unrivaled lengths to address legislatively what it unequivocally recognizes as severe risks from climate change on our natural resources. (See, e.g., Governor's Exec. Order No. S-3-05 (June 1, 2005) [noting that "the combined effects of an increase in temperatures and diminished water supply and quality threaten to alter micro-climates within the state, affect the abundance and distribution of pests and pathogens, and result in variations in crop quality and yield"].) Assembly Bill 32 and the California Air Resources Board's ("CARB") implementing regulations mandate the reduction of state-wide GHG emissions to 1990 levels by 2020, and an 80% reduction of emissions below 1990 levels by 2050. The law specifically recognizes that "global warming will have detrimental effects on some of California's largest industries, including ... forestry." (Assembly Bill No. 32 (2005-2006 Reg. Sess.) § 1, codified at Health & Saf. Code, § 38501, subd. (b).)

Response: CAL FIRE disagrees that it is the responsibility of the Department to adopt regulations which limit the aggregate harvest of timber on private timberlands in relation to the present and anticipated future supply of standing timber. A more correct reading of the court findings referenced in 70 Cal.App4th 962, 967, is that it is the duty of the Board (BOF, Board of Forestry and Fire Protection) to adopt and enforce regulations of all types pursuant to legislative authority to adopt such rules. The finding in the case of 70 Cal.App4th 962, 967 is that the Board must adopt when there is clear legislative authority to do so, but that the Board also has discretion to determine the content of said rules. Found in 70 Cal.App4th 962, 967 "...the trial court clearly stated that the Board has a mandatory or ministerial duty to adopt MSP regulations, while it has a discretionary duty to determine the content of the regulations as long as the content is consistent with the objectives of the FPA. The Board does not have a choice whether to adopt such regulations: the FPA unqualifiedly requires it to adopt them. "To the extent that its performance is unqualifiedly required, it is not discretionary, even though the manner of its performance may be discretionary." (Ham v. County of Los Angeles, supra, 46 Cal. App.. at p. 162.) Said rules regarding MSP and the methodology for showing MSP either through an Option "a" or Option "b" document (or by following the standard Option "c") have already been adopted by the Board and are used by CAL FIRE to determine whether the submitter has met the intent of the regulations. (14 CCR Sec. 953.11). To date, these regulations have not been amended by the BOF pursuant to recent findings and legislation regarding global warming issues.

While the Option "b" method, or Sustained Yield Plan (SYP) have defined procedures for review and approval by the Department pursuant to 14 CCR Sec. 1091.1 et seq., the Option "a" method does not have these same standards for review and approval. For the SYP, the Board has set an effective period of ten years (14 CCR Sec. 1091.9). However, like the Non-Industrial Timber Management Plan (14 CCR Sec. 1090 et seq.), the Board's rules do not prescribe a set time period for the Option "a" document. While the Board's rules clearly establish procedures for amending the NTMP and also prescribe how the NTMP can be transferred in the event of a change of ownership, there is no such procedure or authority granted to CAL FIRE as set in the rules for the Option "a". In the absence of clear intent or authority, CAL FIRE finds that the ability to re-review an already approved Option "a" or to un-approve an already approved Option "a" is not expressed in rule language. However, the Department does find that the language of 14 CCR Sec. 897 contains principals that must be considered in reviewing THPs and that one of these principals is that the objectives of forest management on a specific ownership shall be to balance growth and harvest over time. For that reason, the Department has examined the information contained in the THP regarding the likely effects of atmospheric CO_2 and the scientific literature associated with the subject to determine if the objective of 14 CCR Sec. 897 can be achieved, as will be discussed elsewhere in this Official Response.

In looking at other regulations, CAL FIRE notes that CEQA has not yet been amended to take into account recent findings based on the effects of atmospheric CO_2, although lead agencies have been provided with a possible path to use in the interim. With respect to AB 32, the California Air Resources Board has already issued preliminary findings pursuant to that legislation. The section of the CARB "scoping" plan adopted October 2008 as it relates to forest management states:

"The 2020 Proposed Scoping Plan target for California's forest sector is to maintain the current 5 $MMTCO_2E$ of sequestration through sustainable management practices, including reducing the risk of catastrophic wildfire, and the avoidance or mitigation of land-use changes that reduce carbon storage. California's Board of Forestry and Fire Protection has the existing authority to provide for sustainable management practices, and will, at a minimum, work to maintain current carbon sequestration levels. The Resources Agency and its departments will also have an important role to play in implementing this measure. In addition, the Resources Agency is supporting voluntary actions, including expenditure of public funds for projects focused largely on conserving biodiversity, providing recreation, promoting sustainable forest management and other projects that also provide carbon sequestration benefits. The federal government must also use its regulatory authority to, at a minimum, maintain current carbon sequestration levels for land under its jurisdiction in California.

Forests in California are now a carbon sink. This means that atmospheric removal of carbon through sequestration is greater than atmospheric emissions from processes like fire and decomposition of wood. However, several factors, such as wildfires and forest land conversion, may cause a decline in the carbon sink. The 2020 target would provide a mechanism to help ensure that current carbon stocks are, at a minimum, maintained and do not diminish over time. The 5 MMTCO2E emission reduction target is set equal to the magnitude of the current estimate of net emissions from California's forest sector. As technical data improve, the target can be recalibrated to reflect new information. California's forests will play an even greater role in reducing carbon emissions for the 2050 greenhouse gas emissions reduction goals. Forests are unique in that planting trees today will maximize their sequestration capacity in 20 to 50 years. As a result, near-term investments in activities such as planting trees will help us reach our 2020 target, but will also play a greater role in reaching our 2050 goals. Monitoring carbon sequestered on forest lands will be necessary to implement the target. The Board of Forestry and Fire Protection, working with the Resources Agency, the Department of Forestry and Fire Protection and ARB would be tasked with developing a monitoring program, improving greenhouse gas inventories, and determining what actions are needed to meet the 2020 target for the Forest sector. Future climate impacts will exacerbate existing wildfire and insect disturbances in the Forest sector. These disturbances will create new uncertainties in reducing emissions and maintaining sequestration levels over the long-term, requiring more creative strategies for adapting to these changes. In the short term, focusing on sustainable management practices and land-use issues is a practical approach for moving forward. Future land use decisions will play a role in reaching our greenhouse gas emissions reduction goals for all sectors. Loss of forest land to development increases greenhouse gas emissions levels because less carbon is sequestered. Avoiding or mitigating such conversions will support efforts to meet the 2020 goal. When significant changes occur, the California Environmental Quality Act is a mechanism providing for assessment and mitigation of greenhouse gas emissions."

(Climate Change Proposed Scoping Plan; A Framework for Change; October 2008, prepared by the California Air Resources Board.)

Cal Fire notes the emphasis placed on the interim goal of focusing on sustainable management practices and land-use issues as a way of moving forward to the goals of 2020 and 2050. Additionally, there is emphasis on all sustainable forestry issues such as keeping land in forest production (land-use issues) rather than conversion to other non-forest uses (i.e., agriculture and/or subdivision), and preventing wildfire or damage from insects (and presumably tree diseases) and also the emphasis placed on planting trees that will "...maximize their sequestration capacity in 20 to 50 years."

The BOF has previously defined forest sustainability in regulatory language even before adoption of AB32 as follows:

> **913.10, 933.10, 953.10 Timberland Productivity, Sustained Forestry Planning, Addendum**
> The goal of this section is to restore, enhance and maintain the productivity of the state's timberlands, where feasible.
> **(a)** Where feasible, the productivity of timberlands shall be maintained on a site-specific basis by
> **1)** Meeting the stocking standards of the selected silvicultural or regeneration method, or that level of stocking above the minimum that will achieve long term sustained yield (LTSY) that is proposed in 913.11 a or b.
> **2)** Proposing and implementing an appropriate silvicultural system and regeneration method for the site,
> **3)** Protecting the soil resource and its ability to grow commercial tree species and provide sustainable associated forest values.
> **(b)** Timberland productivity is restored by mitigating the adverse effects of catastrophic events or previous land use activities in order to improve the site capacity to grow for harvest commercial tree species and provide forest values.
> **(c)** Timberland productivity is enhanced by such means as planting, thinning, stand manipulation, stream channel improvement, or other techniques that will lead to increased tree growth and yield, accumulation of growing stock and production of associated forest values.
> **(d)** Measures implemented to mitigate or avoid adverse environmental impacts of timber harvesting contribute to restoration and enhancement of timberland productivity. Plan submitters are encouraged, but not required, to undertake additional measures to restore and enhance timberland productivity. CDF may advise plan submitters of measures which could be undertaken at the plan submitters' option to further restore and enhance timberland productivity.
>
> **(e)** This section does not impose any additional obligation on owners of timberlands where wildfires, insects, disease, wind, flood, or other blight caused by an act of nature reduces stocking levels below any applicable stocking requirements.

While the BOF has not yet directly addressed CO_2 in its other regulatory language, there are a host of Board rules that address forest sustainability and which can help to preserve the ability of California's forests to continue to sequester carbon by; recognizing the importance of old-growth forests that are shown in literature to play an important role in carbon sequestration; limiting the spacing and use over time of even-age treatments which are shown in some studies to create some level of carbon release on short-term basis;

regulating the conversion of forests to other non-forest uses which has been shown in many studies to reduce the potential for carbon sequestration and elevate carbon release on a long-term basis; requiring planting of trees or leaving trees that are capable of replacing trees that are harvested (stocking); allowing for the capture of mortality through easily processed exemptions or emergency notices which can help forest sustainability by reducing the potential of spread of insect or disease or allow salvage of fire damaged trees to be made in to carbon sequestering forest products; and addressing forest sustainability through the requirements of MSP/LTSY. Following is a brief compendium of the Board rules that most apply to the issue of forest sustainability as a mechanism to help address the newly developing issue of carbon sequestration:

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919.16, 939.16, 959.16 Late Succession Forest Stands [All Districts]
(a) When late succession forest stands are proposed for harvesting and such harvest will significantly reduce the amount and distribution of late succession forest stands or their functional wildlife habitat value so that it constitutes a significant adverse impact on the environment as defined in Section 895.1, the RPF shall provide habitat structure information for such stands. A statement of objectives over time shall be included for late succession forest stands on the ownership. The THP, SYP, or NTMP shall include a discussion of how the proposed harvesting will affect the existing functional wildlife habitat for species primarily associated with late succession forest stands in the plan or the planning watershed, as appropriate, including impacts on vegetation structure, connectivity, and fragmentation. The information needed to address this subsection shall include, but is not limited to:
(1) - A map(s) showing: A) late succession forest stands within the planning watershed and any other stands that provide functional wildlife habitat for species primarily associated with late succession forest stands that are on the ownership, B) those stands which are currently proposed to be harvested, and C) known stands on other ownerships.
(2) - A list of fish, wildlife and listed species known to be primarily associated with the late succession forest stands in the planning watershed(s) compiled by the RPF or supervised designee using the "California Wildlife Habitat Relationships System" (WHR), the California Natural Diversity Database, and local knowledge of the planning watershed.
(3) - Description of functional wildlife habitat elements that are important for fish, wildlife and listed species primarily associated with late succession forest stands within the planning watershed(s).
(4) - A description of the structural characteristics for each late succession forest stand and any other stands that provide functional wildlife habitat for species primarily associated with late succession forest stands within the planning watershed including a discussion of important functional wildlife habitat elements identified in (3). Methods used to develop the description, which may be an ocular estimate, shall also be described.
(5) - A description of the functional wildlife habitat objectives, such as anticipated long-term landscape patterns, stand structure for late succession forest stands and any other stands that provide functional wildlife habitat for species primarily associated with

late succession forest stands, and a discussion of anticipated recruitment procedures for important functional wildlife habitat elements. Coordination of functional wildlife habitat objectives on landscape features among ownerships within mixed-ownership planning watersheds is encouraged.
(6) - An analysis of the long-term significant adverse effects on fish, wildlife, and listed species known to be primarily associated with late succession forests.
(b) Where timber operations will result in long-term significant adverse effects on fish, wildlife, and listed species known to be primarily associated with late succession forests in a THP, SYP, NTMP or planning watershed, feasible mitigation measures to mitigate or avoid such long-term significant adverse effects shall be described and incorporated in the THP, SYP or NTMP. Where long-term significant adverse effects cannot be avoided or mitigated, the THP, SYP, or NTMP shall identify the measures that will be taken to reduce those remaining effects and provide reasons for overriding concerns pursuant to 14 CCR Section 898.1 (g), including a discussion of the alternatives and mitigation considered.

(c) A THP, SYP, or NTMP submitter may request that the Director waive subsection (a) above. The Director, after conferring with review team agencies with jurisdiction, may waive subsection (a) above when substantial evidence is presented that would support a determination that post-harvest late succession forest stands or functional wildlife habitat will continually provide adequate structure and connectivity to avoid or mitigate long-term significant adverse effects on fish, wildlife, and listed plant species known to be primarily associated with late succession forest stands within the planning watersheds.

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913.1, 933.1, 953.1 Regeneration Methods Used in Evenaged Management [All Districts; Note variation by District in (a)(4)(A) and (d)(3) Shelterwood Removal Step]
The following types of regeneration methods are designed to replace a harvestable stand with well spaced growing trees of commercial species. Evenaged management systems shall be applied with the limitations described by this rule:
(a) Timber stands harvested under an evenaged regeneration method shall meet the following standards:
(1) Where a regeneration step harvest of evenaged management will occur on stands younger than 50 years of age for Class I lands, 60 years of age for Class II and III lands, or 80 years of age for Class IV and V lands, or equivalent age of trees, based on height as determined according to the appropriate site class, the RPF preparing the THP or SYP must demonstrate how the proposed harvest will achieve MSP pursuant to 14 CCR § 913.11 [933.11, 953.11](a) or (b) provided, however, that the Director may grant an exemption from this section based upon hardship.
(2) The regeneration harvest of evenaged management shall be limited to 20 acres for tractor yarding. Aerial or cable yarding may be 30 acres. Tractor yarding may be increased to 30 acres where the EHR is low and the slopes are < 30%. The RPF may propose increasing these acreage limits to a maximum of 40 acres, and the Director

may agree where measures contained in the THP provide substantial evidence that the increased acreage limit does any one of the following:
(A) by using additional on-site mitigation measures, reduces the overall detrimental effects of erosion thereby providing better protection of soil, water, fish and/or wildlife resources; or
(B) provides for the inclusion of "long corners"; or
(C) create a more natural logging unit by taking maximum advantage of the topography; or
(D) will increase long-term sustained yield; or
(E) provide feasible off-site mitigation measures that can be incorporated in the plan to restore or enhance previously impacted resource areas or other environmental enhancements that will result in demonstrable net environmental benefits within the planning watershed. These measures may include, but are not limited to, watercourse restoration, soil stabilization, road surface stabilization, road outsloping, road abandonment, road reconstruction, enhancement of wildlife habitats and vegetation management. To qualify for an exemption the plan submitter is not required to demonstrate that other feasible options are not available. **(3)** Evenaged regeneration units within an ownership shall be separated by a logical logging unit that is at least as large as the area being harvested or 20 acres, whichever is less, and shall be separated by at least 300 ft. in all directions.
(4) Within ownership boundaries, no logical logging unit contiguous to an evenaged management unit may be harvested using an evenaged regeneration method unless the following are met:
(A) [Coast] The prior evenaged regeneration unit has an approved report of stocking, and the dominant and codominant trees average at least five years of age or average at least five ft. tall and three years of age from the time of establishment on the site, either by the planting or by natural regeneration. If these standards are to be met with trees that were present at the time of the harvest, there shall be an interval of not less than five years following the completion of operations before adjacent evenaged management may occur.

(A) [Northern and Southern] The prior evenaged regeneration unit has an approved report of stocking, and the dominant and codominant trees average at least five feet tall, or at least five years of age from the time of establishment on the site, either by the planting or by natural regeneration. If these standards are to be met with trees that were present at the time of the harvest, there shall be an interval of not less than five years following the completion of operations before adjacent evenaged management may occur.

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913.2, 933.2, 953.2 Regeneration Methods Used in Unevenaged Management [All Districts, Note variations by District in (a)(2)(A)(1)]

Unevenaged management is utilized to establish and maintain an unevenaged stand structure. Unevenaged management attributes include the establishment and/or maintenance of a multi-aged, balanced stand structure, promotion of growth on leave trees throughout a broad range of diameter classes, and encouragement of natural reproduction.

(a) Selection Under the selection regeneration method, the trees are removed individually or in small groups sized from .25 acres to 2.5 acres.

(1) Trees to be harvested or trees to be retained shall be marked by or under the supervision of the RPF prior to felling operations. When openings greater than .25 acres will be created, the boundaries of the small group(s) may be designated in lieu of marking individual trees within the small group areas. A sample area must be marked prior to a preharvest inspection for evaluation. The sample area shall include at least 10% of the harvest area up to a maximum of 20 acres per stand type which is representative of the range of conditions present in the area.

(2) Post harvest stand stocking levels shall be stated in the THP. The level of residual stocking shall be consistent with maximum sustained production of high quality timber products. In no case shall stocking be reduced below the following standards:

(A) Selection System.

1. On Site I lands at least **[125 Coast] [100 Northern & Southern]** square feet per acre of basal area shall be retained.

2. On Site II and III lands at least 75 square feet per acre of basal area shall be retained.

3. On Site IV and V lands at least 50 square feet per acre of basal area shall be retained.

4. Unless the plan submitter demonstrates how the proposed harvest will achieve MSP pursuant to 14 CCR § 913.11 [933.11, 953.11] (a) or (b), the residual stand shall contain sufficient trees to meet at least the basal area, size, and phenotypic quality of tree requirement specified under the seed tree method.

(B) Group Selection.

1. At least 80% of the stocked plots must meet the Basal Area stocking standards of 14 CCR § 913.2(a)(2)(A), [933.2(a)(2)(A); 953.2(a)(2)(A)].

2. Not more than 20% of the stocked plots may meet stocking standards utilizing the 300 point count standard with trees that are at least 10 (ten) years old.

3. An RPF or supervised designee may offset up to 8 plots per 40 plots where those plot centers are initially placed within small group clearings created during the current harvest. Unless substantially damaged by fire, the RPF or supervised designee shall not exclude small group clearings created by previous timber harvesting from the stocking survey.

4. Unless the plan submitter demonstrates how the proposed harvest will achieve MSP pursuant to 14 CCR § 913.11 [933.11, 953.11] (a) or (b), the residual stand shall contain sufficient trees to meet at least the basal area, size, and phenotypic quality of tree requirements specified under the seed tree method.

(3) Within any THP, small group clearings under the selection method shall be separated by a logical logging area.

(4) Following completion of timber operations (including site preparation) not more than 20 percent of the THP area harvested by this method shall be covered by small group clearings.

(5) Exceptions to stocking standards in 14 CCR § 913.2(a)(2), [933.2(a)(2), 953.2(a)(2)] above may be granted only when proposed by the RPF and explained and justified in the plan, but in no case will the exceptions be less than specified in 14 CCR

§ 912.7 (b)(2), [932.7(b)(2), 952.7(b)(2)]. Exceptions may only be granted when the RPF clearly demonstrates that the existing stand will grow substantially less than both the potential site productive capacity and the proposed post harvest stand.

(b) Transition. The transition method may be used to develop an unevenaged stand from a stand that currently has an unbalanced irregular or evenaged structure. The transition method involves the removal of trees individually or in small groups from irregular or evenaged stands to create a balanced stand structure and to obtain natural reproduction.

(1) Area for determination of preharvest seed tree retention levels shall be no greater than 20 acres in size.

(2) This method is to be used to increase stocking and improve the balance of age classes so as to allow the residual stand to be managed by the selection regeneration method. This method shall not be used more than two times for a stand. The RPF shall delineate areas previously treated by the transition method on the plan map.

(3) Stands suitable for the transition method contain adequate quantity and quality of seed producing trees to provide adequate regeneration for new age classes. Stands suitable for this method shall have no more than 50 sq. ft. of basal area greater than the selection basal area standards.

(4) Trees to be harvested or trees to be retained shall be marked by or under the supervision of a RPF before felling operations. A sample area must be marked before the preharvest inspection for evaluation. The sample area shall include at least 10% of the harvest area up to a maximum of 20 acres per stand type which is representative of the range of conditions present.

(5) Immediately following the completion of timber operations, the minimum basal area standards in 14 CCR § 912.7(b)(2), [932.7(b)(2), 952.7(b)(2)] shall be met.

(6) [Coast only] The post-harvest residual stand shall contain at least 15 square feet of basal area per acre of seed trees at least 12 inches dbh or greater for timber sites I, II or III; or 12 square feet of basal area per acre of seed trees 12 inches dbh or greater for timber sites IV or V., except for timber sites I with Coast Redwood. For timber sites I with Coast Redwood, the post-harvest residual stand shall contain sufficient seed trees to meet at least the basal area, size and phenotypic quality of the leave tree requirements specified under the seed tree method (14 CCR § 913.1(c)(1)(A)). Unless obviously stocked, these basal area requirements will be determined from sampling averaged across each harvested area required in 14 CCR § 913.2(b)(1). Unless the plan submitter demonstrates how the proposed harvest will achieve MSP pursuant to 14 CCR § 913.11(a) or (b), where present in the preharvest stand, disease free, undamaged seed trees 18 inches dbh or greater shall be retained post harvest until the stand exceeds the minimum seed tree requirements of 14 CCR § 913.1(c)(1)(A). The seed trees shall be full crown, capable of seed production and representative of the best phenotypes available in the pre-harvest stand.

(6) [Northern and Southern] The post harvested residual stand shall contain at least 15 square feet of basal area per acre of seed trees at least 12 inches dbh or greater for timber sites I, II or III; or 12 square feet of basal area per acre of seed trees 12 inches dbh or greater for timber sites IV or V. Unless obviously stocked, these basal area requirements will be determined from sampling averaged across each harvested

area required in 14 CCR § 933.2(b)(1)[953.2(b)(1)]. Unless the plan submitter demonstrates how the proposed harvest will achieve MSP pursuant to 14 CCR § 933.11(a) or (b) [953.11(a) or (b)], where present in the preharvest stand, disease free, undamaged seed trees 18 inches dbh or greater shall be retained post harvest until the stand exceeds the minimum seed tree requirements of 14 CCR § 933.1(c)(1)(A) [953.1(c)(1)(A)]. The seed trees shall be full crown, capable of seed production and representative of the best phenotypes available in the present stand.

(7) Following completion of timber operations (including site preparation) not more than 20 percent of the Plan area harvested by this method shall be occupied by small group clearings.

(8) The Plan Submitter must provide the Director sufficient information such as growth and stand description to demonstrate that the standards of the selection regeneration method will be met by the third and subsequent entries of Plan areas harvested by the transition method.

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1103 Conversion of Timberland

Any person, firm, corporation, company, partnership or government agency owning timberland for which the timberland owner proposes conversion as defined in Section 1102 shall apply to the Director on a form prescribed by him for issuance of a Timberland Conversion Permit.

1103.1 Prohibited Activity

(a) No timber operations or other conversion activities shall be conducted on timberland which is proposed to be converted to a use other than the growing of timber unless a conversion permit has been issued by the Director or the Board upon appeal and the permit has been recorded in compliance with 14 CCR [*1106.3*](a).

(b) No timber operations shall be conducted on timberland for which a conversion permit has been issued until a Timber Harvesting Plan has been filed with and found in conformance by, the Director in accordance with Article 7 (commencing with Sec. 4581) of Chapter 8, Part 2, Division 4 of the PRC and the rules and regulations of the Board issued pursuant thereto.

(c) The timberland owner shall provide each timber operator copies of both the recorded conversion permit, and recorded amendments thereto, and the approved THP. Copies of said documents shall be conveniently available for inspection at all times during timber operations conducted pursuant to said conversion permit.

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1070 Stocking Sampling

The objective of this article is to describe the stocking sampling procedures that the timber owner or his agent shall use to determine if the stocking standards of the Act and rules have been met following the completion of a timber operation.

1071 Minimum Stocking Standards

Within five years after the completion of timber operations or as otherwise specified in the rules, a report of stocking on the entire area logged under the plan and shown on a revised map shall be filed with the Director by the timber owner or the agent thereof. If stocking is required to be met upon completion of timber operations the stocking report shall be submitted within six months of the completion of operations.
The minimum acceptable stocking standards on logged areas which were acceptably stocked prior to harvest are those specified in the Coast, Northern, and Southern Forest District rules. If not otherwise specified, the following minimum standards apply:
(a) On Site I timberlands as defined by the Board, the average residual basal area, measured in stems one inch or larger in diameter shall be at least 85 square feet per acre; or on Site II or lower shall be at least 50 sq. ft. per acre; or
(b) The area contains an average point count of 300 per acre on Site I, II, and III lands or 150 on Site IV and V lands as specified in PRC 4561.

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1038 Exemption
Persons who conduct the following types of timber operations are exempt from the plan preparation and submission requirements (PRC § 4581) and from the completion report and stocking report requirements (PRC §§ 4585 and 4587) of the Act with the following exceptions and requirements:
(i) no tree that existed before 1800 A.D and is greater than sixty (60) inches in diameter at stump height for Sierra or Coastal Redwoods, and forty-eight (48) inches in diameter at stump height for all other tree species shall be harvested unless done so under the conditions or criteria set forth in subsection 1038(h).
(ii) all timber operations conducted in the Lake Tahoe Region pursuant to 14 CCR § 1038 must have a valid Tahoe Basin Tree Removal Permit (as defined by the Tahoe Regional Planning Agency) or shall be conducted under a valid TRPA Memorandum of Understanding (MOU), when such a permit is required by TRPA.
(a) Harvesting Christmas trees.
(b) Harvesting dead, dying or diseased trees of any size, fuelwood or split products in amounts less than 10% of the average volume per acre when the following conditions are met:
(1) No tractor or heavy equipment operations on slopes greater than 50%.
(2) No construction of new tractor roads on slopes greater than 40%.
(3) Timber operations within any Special Treatment Area, as defined in 14 CCR 895.1, shall comply with the rules associated with that Special Treatment Area.
(4) No tractor or heavy equipment operations on known slides or unstable areas.
(5) No new road construction or reconstruction, as defined in 14 CCR 895.1.
(6) No heavy equipment operations within the standard width of a watercourse or lake protection zone, as defined in 14 CCR 916.4 [936.4, 956.4](b), except for maintenance of roads and drainage facilities or structures.
(7) No known sites of rare, threatened or endangered plants or animals will be disturbed, threatened or damaged.
(8) No timber operations within the buffer zone of a sensitive species, as defined in 14 CCR 895.1.

(9) No timber harvesting within the standard width of a watercourse or lake protection zone, as defined in 14 CCR 916.4 [936.4, 956.4](b), except sanitation-salvage harvesting, as defined in 14 CCR 913.3 [933.3,953.3], where immediately after completion of operations, the area shall meet the stocking standards of 14 CCR 912.7 [932.7,952.7](b)(2), or, except the removal of dead or dying trees where consistent with 14 CCR 916.4 [936.4,956.4] (b). Trees to be harvested shall be marked by, or under the supervision of, an RPF prior to timber operations.
(10) No timber operations on any site that satisfies the criteria listed in 895.1 for a significant archaeological or historical site. Information on some of these sites may be available from the Information Centers of the California Historical Resources Information System within the Department of Parks and Recreation.
(c) The cutting or removal of trees in compliance with sections 4290 and 4291 which eliminates the vertical continuity of vegetative fuels and the horizontal continuity of tree crowns for the purpose of reducing flammable materials and maintaining a fuelbreak to reduce fire spread, duration, and intensity.
(1) Only trees within one-hundred-fifty feet from any point of an approved and legally permitted structure that complies with the California Building Code may be harvested.
(2) The following silvicultural methods may not be used: clearcutting, seed tree removal step, shelterwood removal step.
(3) All surface fuels created by timber operations under the exemption which could promote the spread of wildfire, including logging slash and debris, deadwood, branches exceeding 1 inch in diameter, and brush, shall be chipped, burned, or removed within 45 days from the start of timber operations.
(4) In addition to the slash treatment described in [14] CCR 1038(c)(3), the areas of timber operations must meet the vegetation treatment standards in PRC 4584(j)(1) to (2)(A) illustrated in Technical Rule Addendum No.4 within one year from the receipt of issuance of Notice of Acceptance.
(5) In addition to the limitations listed in 1038(b)(1)-(10), the following apply:
(A) The timber operator shall provide the Director the tentative commencement date of timber operations on the notice required in 14CCR 1038.2. Within a 15 day period before beginning timber operations, the timber operator shall notify CDF of the actual commencement date for the start of operations. The starting date shall be directed to the designated personnel at the appropriate CDF Ranger Unit Headquarters by telephone or by mail.
(B) Timber operations conducted under this subsection shall conform to applicable city or county general plans, city or county implementing ordinances, and city or county zoning ordinances within which the exemption is located. The timber operator or timberland owner shall certify that the city or county has been contacted and the exemption conforms with all city or county regulatory requirements.
(C) Timber operations may not be conducted without a copy of the Director's notice of acceptance of the exemption at the operating site, except where the Director has failed to act within the 5 working-day review period.
(d) The limit of 10% of the volume per acre in (b) above does not apply when harvesting dead trees which are unmerchantable as sawlog-size timber from substantially damaged timberlands, as defined in 14 CCR 895.1, and the following conditions are met:

(1) Timber operations shall comply with the limits established in 14 CCR 1038(b)(1)-(10).
(2) The landowner shall notify the Director of the completion of timber operations within 30 days of their cessation.
(3) At least one inspection conducted by the Director shall be made after completion of operations (Section 4604 PRC).
(4) The RPF certifies that the timberland is substantially damaged.
(5) The RPF shall also certify that no conditions were identified where operations, conducted in compliance with the rules of the Board, would reasonably result in significant adverse effects.
(e) Operations pursuant to an exemption under subsection (c), (d) and (i) may not commence for five working days from the date of the Director's receipt of the Notice of Exemption unless this delay is waived by the Director, after consultation with other state agencies. The Director shall determine whether the Notice of Exemption is complete, and if so, shall send a copy of a notice of acceptance to the submitter. If the Notice of Exemption is not complete and accurate, it shall be returned to the submitter and the timber operator may not proceed. If the Director does not act within five days of receipt of the Notice of Exemption, timber operations may commence.

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1052.1 Emergency Conditions
The following are conditions that constitute an emergency pursuant to 14 CCR 895.1:
(a) Trees that are dead or dying as a result of insects, disease, parasites, or animal damage.
(b) Trees that are fallen, damaged, dead or dying as a result of wind, snow, freezing weather, fire, flood, landslide or earthquake.
(c) Trees that are dead or dying as a result of air or water pollution.
(d) Cutting or removing trees required for emergency construction or repair of roads.
(e) Where high, very high or extreme fuel hazard conditions, the combination of combustible fuel quantity, type, condition, configuration and terrain positioning, pose a significant fire threat on private timberlands. Cutting and removal of hazardous fuels, including trees, shrubs and other woody material, is needed to eliminate the vertical and horizontal continuity of understory fuels, and surface fuels, and/or crown fuels, for the purpose of reducing the rate of fire spread, fire duration and intensity, and fuel ignitability.

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913.11, 933.11, 953.11 Maximum Sustained Production of High Quality Timber Products
The goal of this section is to achieve Maximum Sustained Production of High Quality Timber Products (MSP). MSP is achieved by meeting the requirements of either (a) or (b) or (c) in a THP, SYP or NTMP, or as otherwise provided in Article 6.8, Subchapter 7.

(a) Where a Sustained Yield Plan (14 CCR § 1091.1) or Nonindustrial Timber Management Plan (NTMP) has not been approved for an ownership, MSP will be achieved by:
(1) Producing the yield of timber products specified by the landowner, taking into account biologic and economic factors, while accounting for limits on productivity due to constraints imposed from consideration of other forest values, including but not limited to, recreation, watershed, wildlife, range and forage, fisheries, regional economic vitality, employment and aesthetic enjoyment.
(2) Balancing growth and harvest over time, as explained in the THP for an ownership, within an assessment area set by the timber owner or timberland owner and agreed to by the Director. For purposes of this subsection the sufficiency of information necessary to demonstrate the balance of growth and harvest over time for the assessment area shall be guided by the principles of practicality and reasonableness in light of the size of the ownership and the time since adoption of this section using the best information available. The projected inventory resulting from harvesting over time shall be capable of sustaining the average annual yield achieved during the last decade of the planning horizon. The average annual projected yield over any rolling 10-year period, or over appropriately longer time periods for ownerships which project harvesting at intervals less frequently than once every ten years, shall not exceed the projected long-term sustained yield.
(3) Realizing growth potential as measured by adequate site occupancy by species to be managed and maintained given silvicultural methods selected by the landowner.
(4) Maintaining good stand vigor.
(5) Making provisions for adequate regeneration. At the plan submitter's option, a THP may demonstrate achievement of MSP pursuant to the criteria established in (b) where an SYP has been submitted but not approved.
(b) Where a SYP or NTMP is submitted for an ownership, an approved SYP or NTMP achieves MSP by providing sustainable harvest yields established by the landowner which will support the production level of those high quality timber products the landowner selects while at the same time:
(1) meeting minimal stocking and basal area standards for the selected silvicultural methods as provided in these rules as described;
(2) protecting the soil, air, fish and wildlife, water resources and any other public trust resources;
(3) giving consideration to recreation, range and forage, regional economic vitality, employment and aesthetic enjoyment;
(4) balancing growth and harvest over time. The projected inventory resulting from harvesting over time shall be capable of sustaining the average annual yield achieved during the last decade of the planning horizon. The average annual projected yield over any rolling 10-year period, or over appropriately longer time periods for ownerships which project harvesting at intervals less frequently than once every ten years, shall not exceed the projected long-term sustained yield. A THP which relies upon and is found to be consistent with an approved SYP shall be deemed adequate to achieve MSP.
(c) In a THP, or NTMP, MSP is achieved by:
(1) For evenage management, meeting the minimum stand age standards of 14 CCR § 913.1(a)(1), meeting minimum stocking and basal area standards for the selected

silvicultural methods as contained in these rules only with group A species, and protecting the soil, air, fish and wildlife, water resources and other public trust resources through the application of these rules; or
(2) For unevenaged management, complying with the seed tree retention standards pursuant to 14 CCR § 913.1(c)(1)(A) [933.1(c)(1)(A), 953.1(c)(1)(A)] or 913.2(b)(6) [933.2(b)(6), 953.2(b)(6)], meeting minimum stocking and basal area standards for the selected silvicultural methods as contained in these rules only with group A species, and protecting the soil, air, fish and wildlife, water resources and other public trust resources through the application of these rules.
(3) For intermediate treatments and special prescriptions, complying with the stocking requirements of the individual treatment or prescription.
(4) Timberland ownerships totaling 50,000 acres or less may use subsection (c) to show MSP.
(5) Timberland ownerships of 50,000 acres or more may use subsection (c) through December 31, 1999. Thereafter they may use subsection (c) if an SYP or demonstration of achievement of MSP pursuant to 14 CCR § 913.11(a) [933.11(a), 953.11(a)] has been filed with the department and has not been returned unfiled or approved.
(6) For scattered parcels on timberland ownerships of 50,000 acres or more, subsection (c) may be used to show MSP.

Finally, there is no evidence that the plan submitter has proposed that the effects of atmospheric CO_2 on its industrial timberlands are too speculative to address. While there may be conflicting findings in the scientific literature about exact effects in any specific area of the globe as will be discussed elsewhere in this Official Response, the plan submitter has provided an explanation on pages 115 et seq. about the use and benefits of a continuous forest monitoring system that is already in use which addresses growth and yield information based on actual field conditions. In addition, the plan submitter has discussed the current conservative levels of harvest in relation to the potential long term sustained yield of its properties. Additionally, CAL FIRE notes that the plan submitter has long had information on it's website regarding the role of it's timberlands in sequestering carbon and also has the results of a study titled; "Carbon Sequestration in Californian Forests; Two Case Studies in Managed Watersheds", as will be discussed elsewhere in this Official Response. The link to this article is:
http://www.spi-ind.com/html/pdf_forests/CARBONSEQUESTRATION.pdf

15. **Concern:** It was stated a recent study published by the publicly-funded California Climate Change Center ("CCC Study") predicts significant reductions in timber growth and wood volumes produced by California's forests as a result of climate change. (John J. Battles et al., Climate Change Impact on Forest Resources, California Climate Change Center (March 2006) [copy attached hereto as Exhibit 2].) The study is based on a model constructed using thirty years of observations at UC Berkeley's Blodgett Forest Research Station - a timber stand which is highly comparable to the stand to be harvested under THP-005: The CCC Study evaluates anticipated climate change impacts on the productivity, health, and value of a typical Sierran mixed conifer timberbelt like that covered by THP-005. The study models

two types of climate change impacts - decreased winter precipitation and increased summer temperatures 2 - on two types of timber stand. The timber stands are categorized based on the timber management strategy used on the stand: reserve stands which have not been managed since the turn of the last century; and a ponderosa pine plantation harvested on a 50-year rotation. The research team models impacts for two greenhouse gas emissions scenarios: a high-emissions scenario in which CO^2 emissions continue to climb through the end of this century to three-times pre-industrial levels (30 gigatonnes per year); and a low-emissions scenario in which emissions peak at 10 gigatonnes per year by mid-century and drop to today's levels in 2100. Based on these scenarios, the CCC Study results show declines in growth of up to 31 %, translating into absolute wood volume losses of up to 18% by the end of the century. The results varied by stand type and emissions scenario, but "all climate scenarios considered ... were associated with decreasing volume growth and timber yield." (CCC Study, p. 22) The ponderosa pine plantation, assumed to be managed in a similar fashion to the THP-005 strategy here, showed greater reductions than the unmanaged reserve stand for each scenario. The study concludes: Given the results of the climate-adjusted growth scenarios presented in this report, the economic impacts are likely to be negative, in the form of reduced harvest revenues to landowners, reduced employment and income in timber harvesting and processing, reduced indirectly generated income and employment in rural counties, and reduced Timber Yield Tax revenues distributed to counties. (CCC Study, p. v.) These findings represent important new scientific evidence of reduced timber yields due to climate change which must be addressed by SPI in a revised demonstration of compliance with Rule 953.11. The need for revision is all the greater given that the negative impacts modeled in the study - decreased winter precipitation and increasing summer temperatures - are generally expected to worsen over the next century, i.e. over the period corresponding to SPI's Option A Demonstration planning period. (See L. Bernstein et al., Climate Change 2007: Synthesis Report, Intergovernmental Panel on Climate Change, pp. 7-14 [attached hereto as Exhibit 5].) THP-005 (and any other THP proposed by SPI based on its 1999 Option A Demonstration) is based on obsolete projections and must therefore be disapproved.

Response: The plan submitter has provided a review of the "CCC Study" starting on page 115 of the THP. As discussed, the findings in this report have already been modified based on more data and has changed the claimed decrease in future growth from 31% in ponderosa pine plantations to 25%. The THP goes on to report more recent calculations from Battles unpublished at the time of issue, which shows growth ranging from the negative figures shown here to a 20% increase in future plantation growth as the study findings and calculations evolve. The 25% decrease claimed in the amended "CCC Study" was based on the worst-case-scenario of continued unabated increases in atmospheric CO_2 from emissions. This scenario would presume that no one in any country was going to do anything to abate the GHG emissions from various sources in spite of various treaties and legislation and efforts that are currently underway in California and elsewhere. However, the study also identified the impacts of another scenario of potentials for

increases in CO_2 that was less than "worst-case" (i.e., the A2 scenario) and found that by the end of the century, the severity of the declines, as measured by stem volume increment was around 5% for ponderosa pine plantations when using the PCM climate data projections. (Table 4, Revised Battles Study 2008). This is a large discrepancy, leading to the question of which future CO_2 emissions scenario should a landowner be required to use. CAL FIRE finds that this is perhaps a policy issue for the BOF at a future time when perhaps regulations are under consideration in a public forum with expert testimony and that any requirements to "downsize" growth projections for California forests would have to apply equally to all industrial and perhaps even non-industrial timberland owners in the State and not just to apply unequally to a single timberland owner as a matter of equal enforcement and fair business practices. In fact, CAL FIRE notes in the study Climate Change 2007 (Bernstein et al. 2007) use of six different future emission scenarios. This report models using a B1 scenario of a best estimate temperature change in the last decade of this century of .6 degrees C, another at 1.8 degrees C, another at 2.4 degrees C, another at 2.8 degrees C, another at 3.4 degrees C and yet another at 4.0 degrees C. While these different outcomes were not modeled in the Battles Study for Blodgett Forest, it would be presumed that each would lead to different outcomes of growth based on the wide divergence of findings that were evident in the two scenarios that were used in Battles.

Additionally, a memo was received to the official record for THP 4-08-05/CAL-1 from Timothy Robards, CAL FIRE Division Chief – Forest Biometrician and one of the authors of the quoted Battles et al. 2006 report. The following is a copy of that memo:

> "This memo addresses references made in public comment by Mr. John H. Curran on THP 4-08-05/CAL-1 (Squiqqly) to forest productivity research conducted by myself and colleagues (Battles et al. 2008; Battles et al. 2006). My objective here is to provide updated information on subsequent research on this subject that is specific to the forest types of the Sierra Nevada ecoregion. The background of my involvement in this scientific inquiry is as a Ph.D. candidate at U.C. Berkeley conducting research for my dissertation. I am also employed by CAL FIRE, but that is independent from my work at U.C. Berkeley.
> The modeling that was conducted for the Battles et al. publications used the only existing methodology at the time for California, for incorporating climatic effects into a forest growth projection system. It was based on an analysis that used existing "climate dumb" growth models (Wensel and Robards 1989) and calibrated the projections using climate data. The growth data used for the calibrations was based on the stem analysis dataset of the Northern California Forest Yield Cooperative. Given the relatively short time-horizon of that project, that was the best available approach.
> Recognizing the need for accurate projections of forest growth under variable climate, I have assembled the best available data and constructed new tree diameter and height growth models for the following six species: ponderosa pine (*Pinus ponderosa*), sugar pine (*Pinus lambertiana*), incense-cedar (*Calocedrus decurrens*), Douglas-fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*) and red fir (*Abies magnifica*) (Robards 2009). The tree growth data included the stem analysis data of the previous analysis and three other data sets were used,

providing tens of thousands of observations covering 40 years. These models have been incorporated in the USDA Forest Service's Forest Vegetation Simulator, Westside Sierra variant (FVS-WESSIN).
The models were evaluated on independent tree growth data and found to be unbiased. Projections of mature stands and 20-year old plantations were made for an east-west transect in the mid-Sierra Nevada. These projections used downscaled climate projections of global circulation models (GCMs) developed at the Scripps Institute (Cayan et al. 2006). Ponderosa pine, Douglas-fir, mixed conifer and red fir stands were projected to 2099. The mean annual increment (MAI) of total cubic volume was compared for the first and second halves of the twenty-first century to the last half of the twentieth century. MAI productivity increased in all cases. The range of increase was up to 12% for ponderosa pine and 15% for mixed conifer plantations.
In my opinion, these models and simulations provide the most accurate evaluation of forest productivity in a changing climate currently available for managed forests in the Sierra Nevada Ecoregion. The new information that is referenced here is in process of preparation for publication in peer-reviewed scientific journals. I can provide the MS PowerPoint presentation from the referenced seminar as well as additional explanations to any of the interested parties."

Also, one would have to accept that the conditions, both temperature and precipitation, were similar on the Blodgett forest site as compared to the plan submitters ownerships as described in their Southern Forest District Option "a" or in the THP itself to adopt the findings in the Battles study as being representative. While the Battles study is for ponderosa pine at about 3600' elevation, much of the SPI ownership is at higher elevations than this, although some of their lands are immediately adjacent to Blodgett Forest. THP 4-08-005 itself is around 5400' elevation although located at a slightly more southerly longitude. In fact, the letter of concern included a table that was meant to show the comparison between Blodgett Forest and the THP in question. However, the Battles study itself contains the following caution regarding comparisons between the study area and other areas of the Sierra Nevada forestland: "Care must be taken in generalizing from data obtained from Blodgett Forest and in extrapolating to other parts of the Sierra. All silvicultural methods used at Blodgett may be applied throughout the Sierra. However, the results, particularly of growth, must be extrapolated to other areas with caution because Blodgett Forest is located on high site quality land capable of producing at least 165 ft^3/ac/yr; on relatively flat ground (no cable yarding required), has relatively small compartments (less than 90 acres, and has a high degree to technical competence and supervision of silvicultural activities. In the Sierra Nevada, approximately 7% of private forest industry lands (196,000 ac) and 3% of public lands (222,000 ac) are of similar site quality. Consequently, results from Blodgett Forest are directly applicable to perhaps 420,000 acres in the Sierra." With respect to THP 4-08-005 itself, while it could possibly fit within the compatible area, the ground itself is certainly not as level as the Blodgett site as evidenced by the need to use cable yarding on a portion of the area. This was one of the cautions from the Battles study against making data extrapolations.

While the concern #15 above cites a decrease in precipitation as being a factor in modeled tree growth declines in Battles, the actual study on page 9 states, "Increased summer temperature was the primary driver of these changes. For this specific site, there was no trend in winter precipitation for any of climate scenarios (Figures 1 and 2.)" Indeed, both weather service projections used for future trends in precipitation as shown on the graphs showed no consistency and were "all-over-the-map", so to speak. In fact, the graphs showing future trends of precipitation from Figures 1 and 2 demonstrated a pattern of future precipitation that was very similar to the actual precipitation rates shown on the graph for the period of 1950 to present. Also the report states that the location of the projected data from the weather services was in an area that was both "warmer and drier" than the conditions observed at Blodgett Forest. While this location near the intersection of Mosquito Road and Stope Road in El Dorado County is warmer in the summer and in the winter than Blodgett Forest and has less rainfall, it is not certain that this would make a significant difference in the outcomes of a model that utilizes projected climate data from that location. But this is another factor that makes it increasingly difficult to extrapolate the Battles study data as a guide to making assumptions about growth reductions, especially when considering the widely spaced ownerships held by the plan submitter in the Option "a" document that range from El Dorado County in the north to Tuolumne County in the south and that also have a wide range of elevations within these counties.

Contrary to the concern #15 cited above, the report L. Bernstein et al., Climate Change 2007: Synthesis Report, Intergovernmental Panel on Climate Change does not specifically state that there will be decreased winter precipitation over the next century in the area covered by SPI's Option "a" Demonstration planning period. What the report does state is that "Warming in western mountains is projected to cause decreased snowpack, more winter flooding and reduced summer flows..." This does not necessarily correspond to less precipitation, but could foretell a shift from snow as precipitation to rain. In fact, as noted above with the Battles report, two examples of actual projections from a grid location near to Blodgett Forest in El Dorado County do not show a "...trend in winter precipitation for any of climate scenarios." Additionally, there could be more efficient use of available water from plants that are subject to increasing levels of CO_2, thus potentially negating some of the effects of precipitation shifts. (see next paragraph quote from Battles 2007).

In general, growth and yield for plantations, particularly plantations of ponderosa pine, has received considerable attention and research (Oliver and Powers, 1978, Oliver 1972, Oliver 1979). SPI has modeled yield for their established plantations and LTSY calculations are based on consistency of silvicultural application and the accuracy of the growth projections for these regenerated stands.

It is recognized that California will get warmer but the level of warming is not known. At the global scale there is scientific consensus that the climate is changing and will change in response to increased concentration of greenhouse gases in the atmosphere. The research on how this warming climate will impact forests is underway with a number of researchers testing vegetation responses under a series of warming scenarios. Kahrl and Roland-Holst (2008) in summarizing the impacts of climate change on agriculture, forestry and fishing state:

"Climate change will mean significant changes for agriculture, forestry and fisheries in California. In lower warming scenarios, some of these changes will be beneficial for agriculture and forestry, although there is some debate about the net impact. Both higher and likely lower warming scenarios, even if they cause no net economic impacts will lead to gradual but substantial change in the composition and location of agricultural, forest and fish production... Forestry will experience high yields, but also higher fire risk and drought vulnerability...."

Lenihan, Bachelet, Drapek and Neilson (Lenihan, et al. 2006) evaluated through modeling the impacts on vegetation cover for various vegetation classes. Their conclusions based on the modeling were as follows:

"Significant declines in the extent of Alpine/Subalpine Forest were simulated under all three scenarios, especially under the warmest GFDL-A2 scenario. At high elevation sites the model responded to longer and warmer growing seasons, which favored the replacement of Alpine/Subalpine Forest by other vegetation types.

The simulated extent of forest land in the state (i.e., the combined extent of Evergreen Conifer Forest and Mixed Evergreen Forest) increased relative to the historical extent by 0.5% under the PCM-A2 scenario. Forest cover declined by) 0.6% and 0.9% under the GFDL-B1 and GFDL-A2 scenarios, respectively.

Evergreen Conifer Forest declined under all scenarios, but the largest declines were simulated under the warmer and drier GFDL scenarios. Much of the simulated loss of this type was due to replacement by Mixed Evergreen Forest with increases in temperature, but reductions in effective moisture and increases in fire also resulted in losses to Evergreen Conifer Forest to Woodland, Shrub land, and Grassland."

Lenihan's et. Al. conclusion regarding net primary productivity of simulated ecosystems stated:

"...ecosystem net primary productivity (NPP showed considerable interannual and interdecadal variability, especially over the first half of the 21st century when NPP was frequently greater than normal...even under the drier GFDL scenarios. From about mid-century on, there was a general increasing trend in NPP under the relatively cool and wet PCM-A2 scenario, and a general decreasing trend under the warmest and driest GFDL_A2 scenario (Figure 5a)...

...Net biological production (NBP) is the balance between carbon gained by the ecosystem via net primary productivity, and carbon lost from the ecosystem via decomposition and consumption by fire....The simulated trends in cumulative NBP under the warmer and drier GFDL scenarios (Figure 5b) showed a steady decrease over the course of the future period,...These losses represent a

decline in total carbon stocks of 1.3%(B1) and 2.2%(A2), respectively (Table 2)..."

Forest Management as means of controlling stocking, reducing fire risk, matching tree species to anticipated changes in conditions, responding to insect infestations, etc. can and will be utilized to maintain NPP in managed stands.

Zhang et al.(2008) evaluated and modeled future stem volume in plantations established during the reforestation of the 1992 Fountain Fire which is located in eastern Shasta County. Their findings indicate:

> "...by the age of 36 years, the young plantations will carry as much stem volume as the prefire stands at about the age of 70 years (Figure 3), indicating that a fully stocked plantation with understory vegetation controlled grows much more bole wood than a natural stand does on the same lands...."

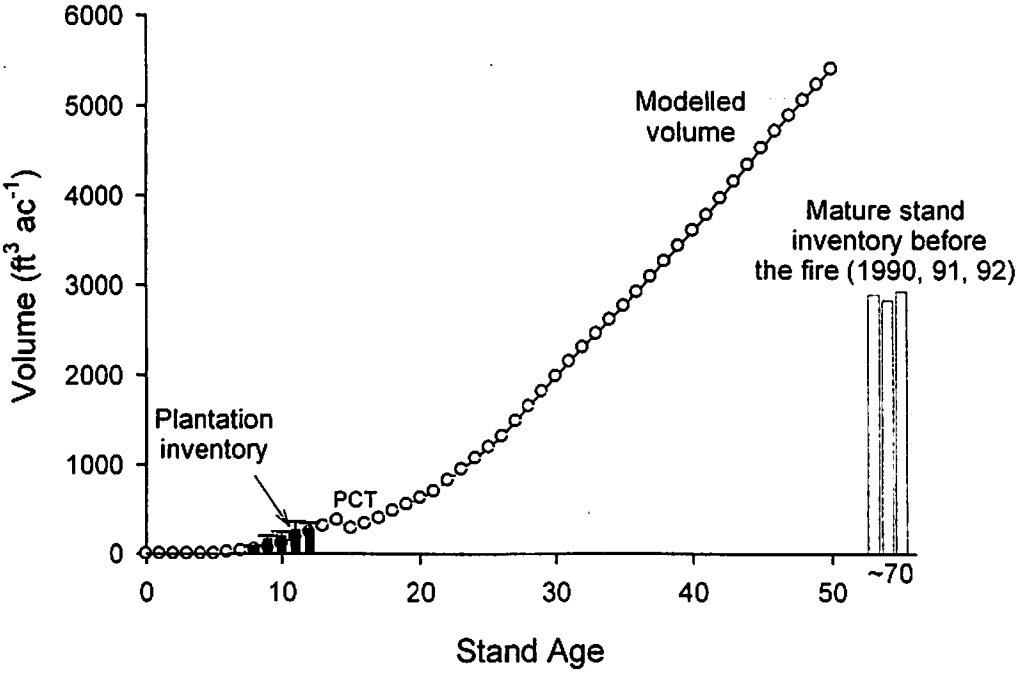


Fig. 3. Stand volume inventory for 1) the original natural-stands (bar only), at about 70-yr-old, in 1990, 1991, and 1992, prior to the Fountain Fire, 2) for some regenerated young plantations (bar+se) at age 8-12 after the fire, and 3) means (±se) of modeled volume (circle and line) based on the combinations of site quality and planted species with the Forest Projection Systems for up to 50 years. Pre-commercial thinning (PCT) has been assumed to be conducted at age 14.

Further, additional research by Battles (Battles et. al., 2009) indicates:

> ...Simulated growth of a commercial pine plantation during a 50-year management cycle (20 to 70 years old) for 18 climate realizations predicted increases in yield as measured in total tree volume. The increased growth was most directly tied to the consistent projections of warmer temperatures during the twenty-first century. Under the different climate scenarios, pine yield increased from 9 percent to 28 percent above baseline by 2100. This result contradicts our previous work, which reported decreases in pine yield by 2100 under similar climate projections.

Based on past measurements in plantations and climate change modeling on the effects of a warming climate on forests there is some reason to be concerned. It is also recognized the modeling and anticipating future conditions is complex. However, it is the Department's conclusion that even-aged management regimes proposed by landowners has a reasonable expectation of providing management options for maximizing net biological productivity of the stands being managed and will benefit sequestration under a wide range of climate warming scenarios. No additional mitigations were determined to be necessary to avoid an adverse impact.

Finally, as noted in the Battles (2008) study, there is no credit given in the model to the possible beneficial effects of CO_2 fertilization on plantation growth or tree growth in general. In Battles (2008), there is a statement that; "The magnitude and persistence of any changes in forest productivity related to changes in CO_2 concentrations are crucial to projections of tree growth and yield. Biogeochemistry-based simulation models (e.g., CENTURY) predict increases in plant productivity under increasing atmospheric CO_2 (transpiration decreases thus improving water use efficiency). Lenihan et al. (2003, 2006) include this CO_2 fertilization-effect in their state-wide analysis of climate change effects on California vegetation. However growth chamber studies of plant physiological response to increased CO_2 routinely report photosynthetic acclimation implying that any increases in productivity will be short-lived (Long et al. 2004). Results from the free air CO_2 enrichment experiments parallel some of the findings from enclosure studies (Long et al. 2004) but a recent meta-analysis of FACE experiments support the contention that tree productivity does respond to CO_2 enrichment (Ainsworth and Long 2005)." Also in the report, "It remains an unresolved question whether the observed increases in tree production under enriched CO_2 translates into sustained increases in stem growth (Norby et al. 2005)." As noted by Shugart et al. (2003) in their national assessment of climate change impacts on forest resources, the direction and magnitude of any carbon fertilization effect will be an important determinant of timber productivity under a CO_2 enriched climate. (Shugart et al., 2003, Forests and global change: Potential impacts on US forest resources. (Pew Center for Climate Change.) It is also interesting to note that Battles 2008 also cites an example of a study where gross productivity gains ranging from 5 to 19% were measured at year three on one species of tree grown in enriched CO_2 environment. If such an example of CO_2 enrichment were projected for pine plantations, it would almost entirely eliminate the growth reductions from increased CO_2 that ranged from 5 to 25% in the CCC Study. However, it is apparent from the literature that not enough work has been done in the area of CO_2 enrichment to make this leap of logic until more studies are done and more information is available.

Regarding the use of models that largely ignore the effects of CO_2 enrichment, from Shugart et al. (2003); "There remains considerable uncertainty in projecting the impacts of climate change on forest yield. How useful are the estimates of future forest yields based on process or biogeochemical models such as BIOME-BGC, TEM, and CENTURY? These models simulate, four different scenarios of global warming, the expected changes in net primary production (NPP) or forest carbon uptake. But can these outputs be used as good proxies for changes in yield?" and "The use of NPP as a proxy for forestry yield is a provisional step necessitated by the absence of good yield models. At present, however, the task of predicting future forest yields in response to climate change or rising CO_2 still must overcome substantial problems. Resolving these uncertainties will require, in addition to the diverse array of new research efforts identified above, progress on a set of experiments and models dedicated specifically to the NPP versus yield issue." (Shugart et al., 2003). The take-away message here is that models are imperfect predictors and are not as desirable as actual yield measurements. This is a point that CAL FIRE has made numerous times in this document in response to Concern #15. (see also the Response to Concern #16) "The more important take home message is that the commenter relied on a scientific work that's was replaced by the same author that now shows increased yield rather than decreased yield therefore SPI's option "a" is conservative and does not need to be updated for global warming impacts.

16. **Concern:** It was stated that SPI has a duty to demonstrate compliance with Rule 953.11 based on "principles of practicality and reasonableness in light of the size of the ownership ... using the best information available." (Cal. Code. Regs., § 953.11, subd. (a)(2) [emphasis added].) Over nine years old now, SPI's Option A Demonstration violates CEQA and the FPA by ignoring the growing body of evidence that climate change will reduce timber yields over the planning period. (See Heninger v. Bd. of Supervisors (1986) 186 Cal. App.3d 601, 609 [Board of Supervisors violated CEQA by "ignoring or discounting this considerable body of evidence" when passing a private sewage ordinance based on a negative declaration].) In its 1999 Option A Demonstration, SPI asserts that it "continues to refine and update this [MSP calculation] process/analysis" overtime and recognizes that "[m]any of the variables involved can change over time." (SPI Southern State Forest District Option A Demonstration, Jan. 1, 1999, p. 3.) Yet, despite the new scientific evidence of the negative impact of climate change on tree growth since 1999, SPI has not updated its LTSY or MSP projections to adjust for the anticipated effects of climate change on tree growth rates and wood volumes in its forests. The 1999 Option A Demonstration includes total constraints on its annual timber production of 530.48 mmbf, leaving a residual potential annual harvest value of 1,140.35 mmbf. The constraints listed in SPI's analysis relate to WLPZ management, wildlife protection measures, visual/aesthetic protections, adjacency limits, and a "non-declining flow" constraint. At no point does the analysis consider or factor in reduced potential LTSY from climate change. Based on the different modeling scenarios used, the CCC Study generates a range of volume growth reductions of 4% - 19% for the reserve stand and 6% - 30% for the pine plantation. In terms of wood yields, the ranges are yield losses of 4% - 18% for the reserve stand and 7% - 31 % for the pine plantation. In its 1999 Option A Demonstration,

SPI cites a LTSY for all of its state forest districts of 1,322.45 mmbf per year. Based on the projected yield reduction ranges in the CCC Study, SPI over-estimates its LTSY and maximum potential annual harvests by 4% to 31 %. Therefore, THP-005 is based on an LTSY calculation that will result in future inventories that are incapable of sustaining the average annual yield projected for the last decade of the planning horizon. This directly violates section 953.11 of the Forest Practice Rules.

Response: CAL FIRE reviewed the case summary for the citation of Heninger v. Bd. of Supervisors (1986) 186 Cal. App.3d 601, 609, and finds it not relevant to the current situation. In Heninger, the issue was preparation of a negative declaration vs. a full blown EIR due to the fact that a considerable body of evidence was ignored. In the current situation, an EIR equivalent has been prepared in the form of a THP and there is no proposal to submit a negative declaration in its stead. The THP examines the evidence in the literature of the possible impacts of global warming on the LTSY as projected in the SPI Option "a" and concludes that the current level of harvest is conservative and that therefore future inventories are capable of sustaining the average annual yield projected for the last decade of the planning horizon. (see THP 4-08-005, pg. 115 et seq.). Additionally, the Department also seriously examined the evidence in the decision making process and has made comments relative to the logic of its decision on the THP. (see Official Response to Concerns 14 through 24). The Department has also examined the rule requirements of the BOF in determining whether the THP is in conformance with existing regulations, as has been mentioned elsewhere in this Official Response.

Concern #16 seems to make an erroneous assumption that the effects of global warming should be treated in the Option "a" document as a "constraint" on SPI's annual timber production. 14 CCR Sec. 953.11(a), which is the Option "a" section of the rules of the BOF, defines "constraints" as limits on productivity from "....other forest values, including but not limited to, recreation, watershed, wildlife, range and forage, fisheries, regional economic vitality, employment and aesthetic enjoyment.) This language corresponds to the Z'Berg-Nejedly Forest Practice Act legislative intent of PRC. 4513b as follows: "The goal of maximum sustained production of high-quality timber products is achieved while giving consideration to values related to recreation, watershed, wildlife, range and forage, fisheries, regional economic vitality, employment and aesthetic enjoyment." This list is devised to include consideration of the "public" values or "other forest values" that are associated with private timberlands.

As explained in the THP and in the Option "a" document, the plan submitter employs real growth data from inventory plots using a proprietary model called Graphical Planning Interface (GPI). (Option "a" document, pg. 14, 1999) The system used with actual inventory plots is similar to a long standing forestry inventory and growth process known as Continuous Forest Inventory (CFI). SPI states in the THP that they are establishing CFI plots in new plantations and has measured over 400,000 individual sample plots on its property as a rate of 1 plot for every 4 acres. At these plots, existing trees were measured for actual recent growth rates and then modeled using the CACTOS growth model. (THP, pg. 115.4) The USFS was using such a CFI type system as early as 1930 based initially on authorities in the McSweeney-McNary Forest Research Act of 1928. Their system was called The National Forest Inventory and Analysis Program (FIA). As recently as 1998, Congress passed the Agriculture Research, Extension, and Education Reform Act. This

legislation authorized significant changes in the FIA Program of the USDA Forest Service, including conversion to an annual (continuous) forest inventory program; development of a core set of procedures to be implemented in a consistent fashion across all US forest lands; continuously updated databases available on an annual basis; and production of complete state-level analyses at five-year intervals. The legislation authorized the Forest Service to develop a strategic plan, in consultation with program partners and customers, detailing how these changes would be implemented over five years. FIA has now completed its second Strategic Plan under the 1998 Act for 2007–11 with advice from various partners and data users across the nation.
(fromhttp://safnet.org/policyandpress/psst/Forest_Inventory_Analysis_5-26-06.pdf).

The advantage of a CFI system or actual inventory system is that it captures real time growth and yield and accounts for biologic factors that have always been present in the environment, even before the growing concern about increases in levels of CO_2. The Carbon input, after all, is just one of numerous conditions that could cause growth and yield to fluctuate in a real life situation. Other examples that foresters have always had to account for in the natural environment include, but are not limited to, the effects of insect and disease on the amount of growing stock, the effects of wildfire on loss of standing timber available for growing stock, the effect of water stress during extended drought, the effect of air pollution on needle retention that in turn reduces photosynthesis and thus reduces growth, the effects of tree removal from timber harvesting, or loss from windstorms, landslides, snow breakage, floods, etc. A forest inventory system, such as the one used by the plan submitter, will account for changes in growth and yield from all these sources, including the Carbon element, and adjustments can be made to projected future growth when, and if, a growth change occurs. These reductions have now been replaced by the newer Battles et.al. 2009 work which no longer shows any reductions.

The THP has correctly noted that current harvest levels are conservative compared to the modeled growth data. The 1999 Option "a" document modeled growth on 1.5MM acres, while in the meantime the actual inventory of SPI lands includes an additional 132,000 acres overall. CAL FIRE has allowed the plan submitter to include the newly purchased area in the Option "a", but to not increase the allowable harvest as a result of the added area. In addition, as part of the original review of the option "a" MSP demonstration, CAL FIRE requested that the projected future growth projections for plantations be reduced by 20% until actual field data can be obtained from the plantations. Plantation trees have to be at the proper height to begin establishment of the long-term measuring (CFI), which among other things includes a measurement at dbh (i.e., diameter at breast height, which is 4.5' above the ground on the high side of the tree). They also have to be spaced properly with pre-commercial thinning or other treatments to be able to access the tree bole and permanently tag the tree so it can be located for future comparative measurements to obtain actual growth information. Until a significant number of trees are included in the CFI system and actual growth is obtained, CAL FIRE found that a "go-slow" approach was preferable and thus requested an arbitrary 20% reduction from the growth information that was modeled.

The THP also points out that there has been a 15% under harvest during the first nine years of the life of the Option "a" compared to volumes that could have been harvested. CAL FIRE points out that there is nothing in the rules of the BOF that require a landowner to maximize their harvest on their lands under the Option "a". In fact, 14 CCR Sec. 953.11(a)(1) specifies that MSP will be achieved by "Producing the yield of timber products specified by the landowner, taking into account biologic and economic factors..." (emphasis added). A landowner under these rules has the option to consider a conservative approach based on any real or imagined "biologic" and/or "economic" factors. CAL FIRE does not have the authority to require a landowner to harvest the maximum potential of the area, but the rules rather require that the "...average annual projected yield over any rolling 10-year period...shall not exceed the projected long-term sustained yield."

The THP also points out a potential 15 to 30% gain in future yield from genetic tree improvements as compared to trees that were used to model the CACTOS growth simulator. While it is intuitive to think that genetic improvements can yield greater tree growth potential, these optimistic numbers are not being actually used in the LTSY/MSP demonstration in the Option "a" until such time as they can be measured with some accuracy. Likewise, the potential gains from CO_2 fertilization as they may, or may not, offset potential growth decreases from any anticipated level of increased GHG are better to be actually measured than they are to be estimated. CAL FIRE supports the contention that the current level of harvest is conservative and in conformance with the rule that requires the average annual projected yield over any rolling 10-year period to not exceed the projected long-term sustained yield. This is based on a number of factors including added acreage under SPI ownership and an under harvest as measured during the first decade of the planning period. However, CAL FIRE has not conducted additional analysis to substantiate SPI's THP information which concludes that the option "a" under represents the potential increase in growth by 67.8%. CAL FIRE, however, realizes that this figure is presented by the plan submitter as a "potential" and that the point is that the landowner has chosen to under harvest in the first nine years of the first decade for a variety of reasons. The plan submitter also states that they will adjust their modeling and future LTSY projections based upon actual measurements of their forests.

17. **Concern:** It was stated that SPI's Option A Demonstration of MSP/LTSY Is Inadequate Under CEQA and the Forest Practice Act in that CDF has a legal duty to ensure that SPI's Option A Demonstration is informationally adequate and reflects harvest rates which do not impair MSP/LTSY. CDF has a mandatory duty under CEQA and the Forest Practice Act to ensure that SPI's Option A Demonstration and any related THP's provide adequate information to agency decision makers and the public. In the CEQA context involving environmental impact reports ("EIR"), the California Supreme Court has stated that "[a] fundamental purpose of an EIR is to provide decision makers with information they can use in deciding whether to approve a project." (Laurel Heights Improvement Assn. v. Regents of Univ. of Cal. (1988) 47 Cal. 3d 376, 394 (Laurel Heights I).) The Court also stated "the public must be equally informed." (Id. at 404.) The informational purpose and requirements applicable to EIR's also apply to THP's and their underlying option (a), (b), or (c) demonstrations of MSP/LTSY pursuant to section 953.11 of the Forest Practice Regulations. In Sierra Club v. Board of Forestry, 7 Cal.4th 1215, 1230 (Sierra Club),

the California Supreme Court noted that the THP "functions as the equivalent of an EIR" and must provide decision makers and the public the same critical information, describing harvest projects and their impacts, as well as alternatives and mitigation measures to reduce those impacts. In the context of an option (b) demonstration, the Court has also noted that MSP/LTSY demonstrations "supplement the THP process by providing a means for addressing long-term issues of sustained timber production, and cumulative effects analysis .... " (Environmental Protection and Information Center v. Cal. Dept. of Forestry & Fire Protection (2008) 44 Cal.4th 459, 482.) Thus, CDF has an obligation to ensure that THP's and their underlying demonstrations of MSP/LTSY are informationally adequate. (See, e.g., Sierra Club, supra, 7 Cal.4th at 1220 [Board of Forestry abused its discretion by approving a THP which lacked critical information].) As noted below, SPI's 1999 Option A Demonstration, and THP 4-08-05 which incorporates that document by reference, are informationally inadequate because they exclude any analysis of the impacts of climate change on SPI's future harvest yields. In addition, based on SPI's responses to EPFW's May 27, 2008 comment letter, SPI's 1999 Option A Demonstration is also inadequate because it does not reflect significant deviations in forest volume growth anticipated by SPI over the remaining years in its planning horizon. CDF therefore has a duty to require SPI to update its 1999 Option A Demonstration prior to approving any THP which relies on that demonstration. CDF also has an obligation under the Forest Practice Act ("FPA") "to adopt and enforce regulations which ... limit the aggregate harvest of timber on private timberlands in relation to the present and anticipated future supply of standing timber." (Redwood Coast Watersheds Alliance v. State Bd. of Forestry and Fire Protection (1999) 70 Cal.App.4th 962, 967 [emphasis added; quoting trial court opinion upheld on appeal]; see 14 Cal. Code Regs., § 953.11, subd. (a)(2).) EPFW cited new scientific evidence in its May 27, 2008 comment letter that climate change will significantly and negatively impact SPI's "future supply of standing timber." In its response, SPI asserts: "That SPI will measure a substantial excess in growth over harvest cannot reasonably be doubted." (THP 4-08-05, Section V, p. 115.7.) In addition to requiring CDF to ensure the informational adequacy of SPI' s THP's and Option A Demonstration, CEQA also requires CDF to independently analyze and evaluate SPI' s factual assertions related to those documents. (Pub. Resources Code, § 21082.1, subd. (c)(1) ["The lead agency shall ... [i]ndependently review and analyze any report or declaration required by this division."]; see, e.g., People v. County of Kern (1976) 62 CaLApp.3d 761, 775 [agency may not adopt draft EIR submitted by applicant as its own without conducting "independent evaluation and analysis"].) As a result, CDF must require SPI to update its obsolete 1999 Option A Demonstration to reflect "the best available information" on climate change impacts on future volume growth (14 Cal. Code Regs., § 953.11, subd. (a)(2)), and must independently analyze and evaluate any assertions SPI makes concerning these impacts on its MSP/LTSY before approving any THP based on the Option A Demonstration.

Response: CAL FIRE has independently analyzed and reviewed the literature associated with climate change, analyzed and reviewed the information contained in the THP, and other pertinent information and has determined that the THP is in conformance with the

rules of the BOF. (see Responses to Concern #14 through #24). As discussed in the THP and elsewhere in this Official Response, actual field measurements are made to obtain growth and yield information relative to the demonstration of MSP in the Option "a" plan associated with the current THP 4-08-005. The potential for a future impact from GHG has been shown in this Official Response to be another one of a myriad of conditions that could cause growth and yield to fluctuate in a real life situation, including the effects of insect and disease on the amount of growing stock, the effects of wildfire on loss of standing timber available for growing stock, the effect of water stress during extended drought, the effect of air pollution on needle retention that in turn reduces photosynthesis and thus reduces growth, the effects of tree removal from timber harvesting, or loss from windstorms, landslides, snow breakage, floods, etc. Adjustments to growth and yield have to be made when any of these situations occur, as measured by field data.

The rules of the BOF that pertain to a demonstration of MSP when using the Option "a" provided in 14 CCR Sec. 953.11(a) provide that the goal of MSP is achieved by: " (1) Producing the yield of timber products specified by the landowner, taking into account biologic and economic factors, while accounting for limits on productivity due to constraints imposed from consideration of other forest values, including but not limited to, recreation, watershed, wildlife, range and forage, fisheries, regional economic vitality, employment and aesthetic enjoyment; and, (2) Balancing growth and harvest over time, as explained in the THP for an ownership..." As noted in the regulation for the Option "a", biologic factors could include any number of environmental stresses that would lead a timberland owner to want to take a conservative approach and not cut to the maximum potential or to estimate growth at less than the maximum potential. And economic factors can also lead to a decision to cut below the maximum potential or to estimate growth in the Option "a" at less than the maximum potential. As noted in the regulation, the THP itself can be used and is being used to addresses the balancing of growth and harvest over time pursuant to the concern about increases in CO_2 on pages 115 et seq. As another example, consider that a forest wildlife species can suddenly be listed as endangered and that such a listing would put a "constraint" on productivity for any landowner with an existing, approved Option "a" plan. The rules allow that the THP can explain the "balance of growth and harvest over time."

Also the rules state that; "The projected inventory resulting from harvest over time shall be capable of sustaining the average annual yield achieved during the last decade of the planning horizon." The THP and this Official Response has shown in the Response to Concerns #14 through #24, that the projected growth itself from the Option "a" is conservative and that the harvests to date, and the harvests during the first nine years of the first decade are capable of sustaining the average annual yield given the best information available at this time. If subsequent field observations show that any of a myriad of conditions arise that either slow or speed up growth substantially, LTSY can be adjusted in plenty of time given a hundred year planning horizon.

18. **Concern:** It was stated that SPI's Option A Demonstration of MSP/LTSY Is Inadequate Under CEQA and the Forest Practice Act in that SPI's responses to the Battles studies are unconvincing and fail to provide SPI's own projections with regard to the impact of climate change on its Option A Demonstration. Rather than

provide its own projections of the impacts of climate change on future forest growth rates, SPI attempts to undermine the study cited by EPFW ("Battles Study") on multiple grounds. These grounds are unconvincing and simply highlight the need for SPI to update its obsolete 1999 Option A Demonstration to reflect and support its own projections. SPI's first response to the Battles Study is that the study has been updated to show a decrease of 25% in future volume growth of ponderosa pine plantations due to climate change, rather than the 31 % decrease previously predicted ("Revised Battles Study") (Revised THP 4-08-05, Section V, p. 115.1.) This response is unconvincing because even a decrease in volume growth of 25% represents a significant decrease that should be reflected in SPI's Option A Demonstration. Second, SPI argues that this 25% decrease is a "worst case" scenario and should be discounted because it assumes "little or no impact from efforts to convert from a carbon intensive lifestyle in what is now a world wide recognized problem." (Id.) This argument is also unconvincing because, despite growing worldwide awareness, there is no evidence of a conversion from carbon intensive lifestyles - indeed, world-wide CO^2 emissions continue to grow in both the developed and developing countries. The argument also ignores the scientific consensus that even in the event of substantial short-term greenhouse gas ("GHG") emissions reductions, accumulation of GHG's in the atmosphere will continue over the next century. Third, SPI selectively quotes language in the Revised Battles Study, warning of the study's limitations, to question "the predictive capacity of this case study to appropriately inform discussion of 100 year modeling of SPI's specific data driven Option A analysis." (Id. At pp. 115.2-115.3.) Yet, SPI provides no information regarding the impact of climate change on its 1999 Option A Demonstration, nor does SPI indicate whether that ten-year old analysis even incorporates a view on such impacts. Whether SPI incorporates the Battles projections into an updated Option A Demonstration, or incorporates its own competing projections, in either case CDF should require such an update in order to meet its own obligation to ensure that THP 4-08-05, together with SPI's other THP's based on the 1999 Option A Demonstration, will not impair the LTSY of SPI's forest holdings. SPI bases its fourth argument on a mischaracterization of Battles's discussion of the theory of " CO^2 fertilization." SPI's response states that the Revised Battles Study "indicates that productivity increases from this effect may range from 5 to 19% as compared to a control population." (Id. at p. 115.3.) In fact, what the Battles study states is that some biogeochemistry-based simulation models predict a CO^2 fertilization effect of this magnitude, but "growth chamber studies of plant physiological response to increased CO^2 routinely report photosynthetic acclimation, indicating that any increases in productivity will be short-lived (Long et al. 2004)." (Revised Battles Study, pp. 206-207 [emphasis added].) The study concludes that "it remains an unresolved question whether the observed increases in tree production under enriched CO^2 translates into sustained increases in stem growth (Norby et al. 2005)." (Id. at 208.) SPI's summary of this aspect of the Revised Battles Study is therefore incorrect. In support of the CO^2 fertilization theory, SPI cites a recent report by the U.S. Climate Change Science Program's Committee on Environment and Natural Resources, which states: Where adequate water is available, nitrogen deposition and warmer temperatures have very likely

increased forest growth and will continue to do so in the near future. However, it is difficult to separate the role of climate from other factors. Rising carbon dioxide levels will very likely increase photosynthesis in forests, but this increase will likely only enhance wood production in young forests on fertile soils. SPI then notes that the Revised Battles Study found no trend in winter precipitation levels to conclude by implication: "Thus it is reasonable to assume the central Sierras are currently likely to have adequate available water and therefore it is also likely that rising carbon dioxide levels will increase photosynthesis in forests, and this increase will likely enhance wood production in young forests on fertile soils like those owned and managed by SPI." (Revised THP 4-08-05, Section V, p. 115.3.) This reasoning is also unconvincing. SPI's assumption that its forests are "currently likely to have adequate available water" (Id.) in the winter says nothing about future winter duration and precipitation levels, and ignores the Battles studies' compelling evidence that longer, hotter, drier summers will lead to decreases in stem volume growth. At best, SPI has made an argument that photosynthesis may increase in future winters; but SPI makes no argument about the impacts of climate change on stem volume growth during the hot, dry non-winter periods, the duration of which is expected to lengthen over time. Thus, SPI's conclusion that the lack of a trend in winter precipitation levels in the models is grounds for assuming "enhanced wood production in young forests on fertile soils like those owned and managed by SPI" (Id.) is unsupported. Lastly, SPI emphasizes that the Revised Battles Study "only arrived at its 25% loss projection in the last 30 year projection period at the end of this century" (Id. at p. 115.5.), to imply that this fact reduces the study's predictive value and relevance. The implication is both misleading and reflects a misunderstanding of section 953.11 of the Forest Practice Rules. First, that the Revised Battles Study shows the highest volume declines in the last 30 years of the planning horizon is not surprising since the study also shows a steady decrease in stem volume growth projections over time. The same modeling scenario which shows this 25% decline for the period 2071-2100 also shows a 6.4% decline from baseline for the 2001-2030 period, and an 11.8% decline from baseline for the 2036-2065 period. In sum the rate of decrease in stem volume growth is substantial and increasing over time. Second, subdivision (a)2) of section 953.11 requires that SPI's "projected inventory resulting from harvesting over time shall be capable of sustaining the average annual yield achieved during the last decade of the planning horizon." (Emphasis added.) Thus, the Revised Battles Study's projections for the end of SPI's planning horizon are particularly relevant to the question of whether SPI's MSP/LTSY demonstration is accurate, since section 953.11, itself, focuses on that period. In sum, none of SPI's criticisms of the Revised Battles Study undermines that study's fundamental conclusion, i.e., that an increase in the duration and severity of dry, hot summer seasons will lead to decreased tree growth. CDF should therefore require SPI to update its Option A Demonstration to reflect the Battles projections, or, at a minimum, incorporate its own competing projections for climate change impacts on future timber yields. There is no evidence, either in the 1999 Option A Demonstration or in SPI's responses, that SPI has incorporated any such projections in its analysis to date.

Response: CAL FIRE understands the information in the THP on page 115 et seq regarding the reduction in the growth effects noted in the "Battles study" to show that the study is somewhat in a state of flux. In a short period of time, there was more information from Battles to show a reduction of about 20% in the anticipated negative growth impacts from the "worst-case scenario" of increasing GHG. The Department is not sure if this would be considered a "convincing" or "unconvincing" argument as that would probably depend on the opinion of any particular reader, but it was presented as a statement of fact to show that the information regarding the impact of CO_2 as found in this one single study has changed. In fact, the THP reports on recent information from Battles as personal communication that show growth increases are possible given recalculation. While a projected decrease of 25% may still be large, it is within the range of factors shown in the THP to be "conservative" in relation to the difference between actual harvested volumes during the first decade of the planning horizon and potential growth gains from added acreage, undercutting and the other factors as discussed in the Response to Concern #15. More importantly the author himself says it was wrong and growth increases are now more likely to result from predicted climate change. (Battles etal. 2009)

With respect to the statement in the Concern above that there is no evidence that global GHG rates are going to reduce over time, CAL FIRE has already noted that there are already treaties in effect on a global level to do just that and that California has already passed legislation to roll back rates of CO_2 emissions. The cited study (Raupach et. al., 2007) does not actually make predictions about future C emissions or future uses of fossil fuels or better technologies, but instead reports on the levels of fossil fuel uses for different regions of the world for the past decade or so. While these levels have increased, at least up to the most recent reporting period in the study of 2005, there was no indication in the report that future levels could be managed or held steady or even decreased due to technology. Also, there was no indication in the report that the recent extreme rise in fossil fuel costs and the state of the world-wide economy might have already had some impact on the use of fossil fuels, both in the United States and elsewhere in the world. Additionally, the models used to project future CO_2 rates have used numerous different scenarios because the actual rate of increase/decrease is really not known at this time. After all, these projections are being made for a period of time that is at least 90 years away and no one really knows what gains may be made in technology over that period of time. Bernstein et al. 2007 uses six different future emission scenarios as is discussed in the Response to Concern #15. Regarding the use of models themselves, regardless of how many future climate scenarios are imagined, the study "Forest Carbon Sequestration and Harvests in Scots Pine Stand Under Different Climate and Nitrogen Deposition Scenarios" state; "There are many uncertainties in model based forecasting. Firstly, the climate scenario used might not be correct. For example, the precipitation might decrease during the growing season and decrease growth. Secondly, disturbances in the forest, such as insects, fire, wind damages and fungi might become more common. Thirdly, other tree species than pine might be more tolerant to changing environmental conditions. (Pussinen et al, 2000)."

Regarding the concern about revising the Option "a" for the effects of global warming, CAL FIRE has previously discussed the methodology for including changes to the Option "a" rolling ten year harvest levels in the THP pursuant to 14 CCR 953.11(a). (See the

Response to Concern #17). As discussed above, actual measurements of plantation growth will be undertaken via the CFI method to ascertain real life conditions that would reflect any slow down of growth, or increase in growth as discussed about carbon fertilization, or increase in growth from genetic tree improvement that is not accounted for in the CACTOS growth model and that there is time to get these measurements since the effects noted in the Battles study occur in the last decades. Additionally, the CACTOS model itself was built on tree growth measured during an extended California drought period, as discussed in the THP and in the Battles study, and has a built in bias towards slower growth than has been actually observed. (From Battles; "Wensel and Turnblom (1998) noted that observed growth of stands used to develop CACTOS in 1978-1983 was consistently less than the growth predicted by CACTOS for the period between 1988-1991.) Leading to another question, which is "What growth model, other than CACTOS, would be used if one were to redo the Option "a" projections?" That is the standard growth table for California and it is not adjusted for some as yet unknown future global climate change. From the Revised Battles Study, "Initially, CACTOS was built without reference to climate. It was designed to provide short-term projections of tree growth using tree and site characteristics." And; "CACTOS has become the industry-standard for interior California." The Battles study reports an effort to use a climate model in CACTOS to explain the differences between the CACTOS model developed in 1978-1983 and the actual observed growth for the period 1988-1991. "Their model, which considers the effects of both current and previous year winter rain and summer temperature on tree growth, explained 67% of the observed growth variation for the two pine species (sugar pine and ponderosa pine) and 74% of the variation for the other three conifer species (white fir, DF, and incense-cedar)." (Battles study) "While Yeh and Wensel (2000) provide the necessary parameters and equations, the climate model <u>was never incorporated</u> into CACTOS." (Id, emphasis added) The combined model to incorporate climate into CACTOS has never been peer reviewed and is used in the Battles study in an experimental way that is not recognized as the industry standard at this time. CAL FIRE would likely not be in a position to support the use of a combined CACTOS growth and climate model in an Option "a" (or SYP or NTMP) to project growth over a century of time without getting a lot more expert testimony on whether such a model was predictive and statistically valid. This is only part of the problem, since one would also have to accept whatever climate scenario might be used in any particular Option "a" (or SYP or NTMP) for the level of GHG as predicted for the next ten decades.

The concern above is critical of comments in the THP regarding future precipitation rates and especially SPI's assumption that its forests are "currently likely to have adequate available water". However, the Battles study uses data from projections of future precipitation from the NOAA's Geophysical Dynamics Laboratory and the National Center for Atmospheric Research/Department of Energy Parallel Climate model under two different emission scenarios for an area that is somewhat close to Blodgett Forest. These models do not show a pattern of predicted rainfall that is substantially different from the past fifty years of actual rainfall, as shown in Fig. 1 and 2 of the revised Battles study. (see also the Response to Concern #15) It should be noted that almost all the "precipitation" that falls in this part of California comes in the winter. Hence the THP notes the findings in Battles for its assumption about the adequacy of available water and then uses this assumption to make predictions about possible increases in photosynthesis. While there is a concern

about the predication of increasingly long-hot summers, it should also be noted that, when looking at the growth-rings in a trees cross-section, most of the expansion of growth comes during the summer months and very little occurs during the winter. It seems to be intuitive that an increase in temperature could mean a corresponding increase in the length of the growing season, and more opportunity for growth expansion given the availability of water.

It was also pointed out in the concern above that there is not only a growth decrease of 25% in the worst case scenario at the end of the decade, but there is a corresponding decrease of 6.4% in the first three decades and 11.8% in the second three decades and that SPI in the THP ignores this by focusing on effects in the final three decades. CAL FIRE, however, reasons that both these decreases are within the conservative level of harvest of 15% that has occurred on SPI lands within the first 9 years of the first decade and that additional acres have been added to the Option "a" for which there have been no increases in allowable annual harvest. (see also the Response to Concern #16) However, using the PCM climate prediction from Battles plantations with the B1 forecast of future levels of CO_2, these future growth responses are more like a positive .5% in the first three decades and a negative 3% in the second three decades. Concern #18 above focuses on the worst-case scenario alone, and at the present time it is not known what the actual CO_2 level will be, or for that matter, what will be the offsetting effect of CO_2 fertilization. (From Battles; "The magnitude and persistence of forest productivity increases due to CO2 enrichment is an area of active research (Korner et al. 2005). Thus our exclusion of CO2 enrichment may bias our projections toward lower growth if fertilization effects exists.") CAL FIRE notes that other evidence from the literature uses up to six different future CO_2 levels for modeling. (see the Response to Concern #15) With regard to the concern that the Option "a" does not reflect the effect of GHG increases, the THP itself describes the relationship between the Option "a" and the expected future impacts of CO_2 levels on growth pursuant to 14 CCR Sec. 953.11. (see also the Response to Concern #17)

19. **Concern:** It was stated that SPI's Option A Demonstration of MSP/LTSY Is Inadequate Under CEQA and the Forest Practice Act in that SPI's emphasis on current conditions in its existing plantations to defend its outdated 1999 Option A Demonstration is misplaced: the major climate change impacts on volume growth are anticipated to occur in the future. SPI's response to EPFW's comments and the Battles models states: "The most important reason that there should be no concern as to the validity of SPIs'[sic] future projection of LTSY is that it is based on the most intensive data set ever collected on an individual forest ownership and not an abstract model." (Revised THP 4-08-05, Section V, p. 115.4.) In sum, SPI argues that its 1999 growth rate projections are more reliable than the Battles projections because "the harvest volume projections from SPI lands for the next 50 to 80 years are not from modeled future plantations, but from actual trees that exist today growing in the climate and atmospheric conditions that we have the most experience with." (Id. [emphasis added].) As an initial matter, the implication from this response that the Battles studies are based only on "modeled future plantations" is misleading. In fact, the Battles studies look at three types of forest: reserve stands

left unlogged; uneven-aged stands logged using single-tree selection; and pine plantations grown in clear-cut areas. The projected climate change impacts on the reserve and uneven-aged stands are based on data derived from actual tree stands at the Blodgett Forest Research Station. SPI's response therefore ignores the significant growth declines projected for these reserve and uneven-aged stands (i.e. maximum declines of 19% and 20% respectively through the year 2100). (See Revised Battles Study, pp. 203-204.) In addition, while it is true that the Battles studies' growth projections for the third type of forest - ponderosa pine plantations grown on clear-cut areas - are based on simulated plantations generated using the CACTOS simulator, these projections still provide valid evidence of the negative impacts of climate change on forest growth. The projections were generated using CACTOS, which is the "industry-standard for interior California .., to project growth and yield in state timber harvesting permits .... " (Id. at p. 196.) Indeed, SPI itself incorporates CACTOS into its own proprietary planning model to develop the growth and yield scenarios underlying its LTSY values. (See 1999 Option A Demonstration, p. 14.) That the Battles projections are based on data generated using CACTOS is therefore not a ground for disregarding those projections. Lastly, SPI's planning focus in this response on "actual trees that exist today" (but will not exist in the later decades of the planning horizon) and on past "climate and atmospheric conditions" is misguided. Since the dramatic changes in climatic conditions expected by experts will occur in the future, an Option A Demonstration based on conditions in 1999 or earlier cannot possibly reflect these changes. The trend in harvest levels and LTSY from our Option A is an upward trajectory, significantly and continuously increasing from current harvest levels. So if there is any uncertainty as to the eventual upward growth rate of the LTSY on this property it is only a matter of how much higher the growth rate will be at some future date than it is today. We know that the growth rate will be accelerating but we may not know exactly how much except that we will be actually measuring it every decade and adjusting estimates accordingly. Thus current harvest levels are not impacted by the potential uncertainty predicted by this study. (Revised THP 4-08-05, Section V, p. 115.4) SPI provides no evidentiary support for this assertion which, as a result, amounts to nothing more than wishful thinking. It is conclusory to argue that because SPI projected an "upward trajectory" in 1999, the only uncertainty about the impacts from climate change over the coming one hundred years on SPI's plantations is how much higher the future growth rates will be compared to today. In addition, this assertion by SPI again reflects a misunderstanding of section 953.11 of the Forest Practice Rules. The question that section demands is not whether "current harvest levels are ... impacted by" potential growth declines in the future - it is whether current and planned harvest levels will result in a projected post-harvest inventory "capable of sustaining the average annual yield achieved during the last decade of the planning horizon." (Forest Practice Rules, § 953.11, subd. (a)(2).) SPI implies that it can simply wait for changes to occur and adjust its LTSY and harvest estimates accordingly. Whether those predicted changes are accelerating growth as SPI asserts, or decreasing growth as the Battles studies predict, SPI' s approach turns the principle of an Option A Demonstration on its head. Subdivision (a)(2) of section 953.11 requires a forward-looking analysis "demonstrating the balance of growth

and harvest over time for the assessment area," not just periodic retrospective adjustments to yield projections based on past observations as SPI implies. In sum, SPI must ensure that its current harvest levels will result in LTSY by the end of the planning horizon, given "the best available information" regarding, inter alia, climate change impacts on LTSY. SPI must also incorporate this analysis into its Option A Demonstration. SPI's currently operative 1999 Option A Demonstration fails to provide this analysis.

Response: Concern #19 is critical of the comment in the THP that "...the harvest volume projections from SPI lands for the next 50 to 80 years are not from modeled future plantations, but from actual trees that exist today growing in the climate and atmospheric conditions that we have the most experience with (THP page 115.4)." CAL FIRE understands the statement to be correct insofar as it goes for plantation growth, but agrees that this particular statement ignores the fact that part of the Battles Study uses actual growth information from Blodgett for the single tree selection and reserve areas. CAL FIRE also reasons and finds additional evidence that the THP discusses the methodology used in Battles as being experimental and with limitations in regards to modeling future growth on single tree selection, reserve areas and plantations. For example, as stated in the THP pg. 115.3 regarding Battles, SPI states; "It [the study] was also conducted to test if current models could be used outside of their traditional role and be used to predict potential impacts on yield to potential climate change scenarios without actual real data on either the magnitude of the climate change or the known measured response to trees growing in those conditions. As a scientific query to push the bounds of current models and to help identify limitations and direct future research they clearly accomplished their goals." Also on THP pg. 115.2, SPI quotes from Battles; "Clearly a better understanding of the long-term effects of climate change and atmospheric CO2 concentrations on tree water relations, forest productivity, and carbon allocations is crucial to improving projections of future forest conditions." Also stated regarding the modeling effort in Battles and quoted in the THP regarding the reliability and limitations; "Modeling specific impacts of future climate on California's forests is a precarious undertaking. In particular, we are concerned about the consequences of unanticipated events. We have only modeled the direct effects of climate change and not considered potential indirect effects on the disturbance regime (sensu Aber et al. 2001). Fire is an obvious concern. Insect outbreaks or pathogen interruptions also have the potential to entirely swamp climate-related growth effects on forest yield and tree mortality. The nature, magnitude, and timing of these transforming events are difficult to predict."

While it may be harsh to use the term "abstract" in reference to the modeling used in Battles, it has been discussed in the Responses to Concern #17 and #18 that the combined climate model was not devised for the purpose that it is being used in the study. As stated in Battles; "While Yeh and Wensel (2000) provide the necessary parameters and equations; the climate model was never incorporated into CACTOS." (emphasis added) The combined model to incorporate climate into CACTOS has never been peer reviewed. It is not clear that CAL FIRE would be in a position to accept the combined CACTOS growth

and climate model in an Option "a" without expert input since it has not been previously used as the industry standard.

The concern above cites a report "Our Changing Climate Assessing the Risks to California", but the actual reading of the report generalizes several different future climate scenarios. The report states; "The latest projections, based on state-of-the-art climate models, indicate that if global heat-trapping emissions proceed at a medium to high rate, temperatures in California are expected to rise 4.7 to 10.5° F by the end of the century. In contrast, a lower emissions rate would keep the projected warming to 3 to 5.6° F. (A. Luers et. al., 2006)" While these figures are of concern, they represent a very wide range of alternative situations and effects and no one knows which of them are closer to the truth. This report also states; "On average, the projections show little change in total annual precipitation in California. Futhermore, among several models, precipitation projections do not show a consistent trend during the next century. The Mediterranean seasonal precipitation pattern is expected to continue, with most precipitation falling during the winter from North Pacific storms. One of the three climate models projects slightly wetter winters, and another projects slightly drier winters with a 10 to 20 percent decrease in total annual precipitation. (A. Luers et. al., 2006)"

Regarding the last concern in the paragraph for Concern #19, namely that SPI's planning which is focused on "actual trees that exist today" is misguided, comments in the THP (and Option "a") note that continuous inventories will be made and that CFI plots are going to be installed in plantations to actually measure growth. The term "today" appears to be a floating period of time which includes the time when future measurements will be taken. CAL FIRE reads this to mean that growth estimates will be made based on actual growth which will take into account climatic conditions as they occur over time. Meanwhile, the purpose of 14 CCR Sec. 953.11 is to place a restriction on the amount of harvest that occurs during a 10-year rolling period so that it does not exceed the average annual yield predicted during the last decade of the planning horizon. This is not to say that the prediction is perfect, especially considering a one hundred year planning period. There are a lot of things that can happen in one hundred years to a natural system and there are perhaps even more political or economic things that can happen that would eventually lead to an imperfect prediction. For example, wildfire, insects, disease, flood, windstorm, snow breakage are just a few of the other natural things that can happen to the growing stock that could change yield. Listings of plant or animal species, zoning, adding or subtracting acreage, new environmental constraints, or new regulations which impose additional limitations are also some of the things that could impact yields, along with such factors as changing markets, changing values of various forest products, new technologies, new uses for forest products that were not envisioned initially. Most or all of these things cannot be forecast in an Option "a" that is written for a time period 100 years in the future. The THP can describe how these unexpected changes relate to the Option "a" under 14 CCR Sec. 953.11(a)(2). Actual growth changes measured on the ground in growing trees are likely to be the best way to account for these myriad of conditions that can change the prediction and to determine if and when the MSP/LTSY should be adjusted. This includes SPI's contention that growth will continue to accelerate, based on their contention that growth in plantations is currently underestimated, partially because CAL FIRE requested them to

reduce the forecast by 20% and partially because SPI claims gains in genetic tree selection which is not accounted for in current growth models. CAL FIRE finds that these gains or losses would best be proven by measurements before they are used for predictions in long term growth (LTSY/MSP). This is how the plan submitter states future adjustments to yield will be made, by direct measurements.

20. **Concern:** It was stated that SPI's Option A Demonstration of MSP/LTSY Is Inadequate Under CEQA and the Forest Practice Act in that SPI's five factors for arguing that its 1999 Option A Demonstration is conservative reflect a misunderstanding of the informational role of that document, and only highlight the many ways in which SPI's Option A analysis has become obsolete. SPI' s response lists five reasons why its "Option A documents are not only responsive to any future climate change they are potentially conservative by as much a net 67.8%." (Revised THP 4-08-05, Section V, p. 115.7.) These reasons include "15% under-harvest, 8.8% increase in land ownership and likely increased yield, 15% to 30% increase from tree improvement, 20% pre-cautionary reduction in plantation yield projections, a 5% to 19% potential CO^2 fertilization all balanced by a speculative 25% decrease from the effects of global climate change." (Ibid.) As a general matter, SPI's assertion of these factors in defense of the adequacy of its 1999 Option A Demonstration - none of which is discussed in that document - only highlights how obsolete the 1999 Option A Demonstration has become. If SPI truly believes that the best available information supports increasing its LTSY projections by up to 67.8%, SPI should update its Option A Demonstration to reflect that belief. Instead, SPI appears to argue that as long as it "can safely continue to operate under it's approved Option A," regardless of any changes in its projections, it has no obligation to update the Option A Demonstration. (Id. at 115.7.) Like the Environmental Impact Report under CEQA, a THP together with any option (a), (b), or (c) demonstration serves an informational purpose vis-à-vis the public and decision makers. (See Laurel Heights I, supra, 47 Cal 3d 376, 404 ["'To facilitate CEQA's informational role, the EIR must contain facts and analysis, not just the agency's bare conclusions or opinions.' (Citation.)"]; Sierra Club v. Ed. of Forestry (1994) Cal.4th 1215,1230 [a THP "functions as the equivalent of an EIR"]; Environmental Protection and Information Center v. Cal. Dept. of Forestry & Fire Protection (2008) 44 Ca1.4th 459,482 [a SYP "is intended to supplement the THP process .. ."].) As a result, SPI cannot rely on an Option A Demonstration which is informationally inadequate simply because its current harvest levels do not exceed those set forth in that demonstration. Such an approach completely ignores the informational role of the document. With respect to the specific factors mentioned by SPI as evidence of conservatism in its LTSY projections, most are either unsupported or irrelevant. For instance, SPI's mention of an 8.8% increase in land ownership is inapposite to the question of whether its planned harvests in the area covered by its 1999 Option A Demonstration comply with section 953.11. Those new ownerships are not covered by the 1999 Option A document and therefore fail as a factor offsetting the predicted negative impacts of climate change on future volume growth. SPI also argues its LTSY projections are conservative based on "estimates in potential future yield increases from genetic improvement studies ranging from 15 to 30%." (Revised

THP 4OS, Section V, p. 115.7.) Since SPI cannot genetically improve existing tree plantations which are on 80-year rotations, even assuming such volume increases were possible, it is incorrect to suggest that genetic improvement will have a 15-30% positive impact on overall LTSY during the current 100-year planning horizon. In addition, as noted, SPI should update its Option A Document to incorporate and explain these projected yield increases if it truly anticipates them. As a third basis for arguing that its LTSY projections are conservative, SPI cites the CO^2 fertilization theory it apparently gleaned from the Battles studies. As noted above, however, there is considerable doubt over whether CO^2 fertilization will lead to sustained increases in volume growth. SPI offers no evidence that it has independently considered CO^2 fertilization. Again, if SPI plans now to rely on that theory to assert a 5 -19% underestimation of its LTSY, SPI should incorporate and explain its assertions in a revised Option A Demonstration. Lastly, SPI asserts that its 1999 Option A Demonstration understates the true LTSY by 20% due to a request from CDF to reduce their long-term projections by this amount. (Revised THP, Section V, p. 115.5.) This is a surprising assertion since there is no mention in the 1999 Option A Demonstration itself regarding such a "pre-cautionary reduction." (Id. at 115.7.) The 1999 Option A Demonstration includes a full section describing and summarizing the constraints on LTSY, including reduced harvesting to preserve (i) aesthetics and recreation, (ii) range and forage, (iii) watersheds and fisheries, (iv) wildlife, and (v) snags/habitat. (1999 Option A Demonstration, pp. 21124.) The 1999 document also discusses "combined other value consideration[s]" which limit its harvesting, including "site-specific THP decisions," its non-declining flow policy (i.e., a "never declining harvest level"), and "restrictions to avoid cumulative effects."(Id. at 27.) However, as noted, there is no mention of a 20% "pre-cautionary reduction." As with the other assertions now advanced by SPI to argue that its LTSY is materially understated, CDF should require SPI to update its Option A Demonstration to fully disclose and explain any such "pre-cautionary" reductions underlying its LTSY projection. In sum, as noted in EPFW's May 27, 2008 comment letter and here, there is strong new scientific evidence that climate change will negatively impact tree volume growth. Rather than dispute this general prediction, SPI's response to EPFW's comments focuses on minor methodological disputes with the Battles Study cited by EPFW to undermine that study's conclusions, and proposes several unrelated reasons why its current LTSY is understated. On this basis, SPI concludes that it "can safely continue to operate under it's [sic] approved Option A." (Id. at 115.7.) In addition, SPI reasons no update is necessary because "there is no rule requirement for 10 year updates of Option A demonstrations (as there is for Option B 'SYPs') .... " (Id. at pp. 115.6-115.7.) This approach ignores the fundamental informational role of THP's and their underlying MSP/LTSY demonstrations, and directly contradicts the undertaking SPI made in its 1999 Option A Document almost ten years ago: We monitor our inventory, growth and harvest activities over time, and will submit updates to this document as necessary. We will use the Option B - FPR section 1091.13 rule as guidance for determining whether updates are substantial or minor. ("any deviation from the average harvesting projections in any ten-year period which exceeds ten percent" shall be deemed substantial and would require modification or amendment of this

document.) (1999 Option A Demonstration, p. 3.) Since SPI now cites in its response aggregate deviations of 92.8% (and a 67.8% net deviation) over the remainder of the planning horizon, including a 15% "under-harvest," SPI is well beyond the 10% threshold used for updating Option B demonstrations. CDF should therefore require SPI to update its 1999 Option A Demonstration so that it is an adequate informational document and to ensure that the harvest levels reflected in THP 4-08-05 and SPI's other planned harvests do not impair SPI's ability to achieve LTSY.

Response: The plan submitter explains on page 3 of the 1999 Option "a" that "any deviation from the average harvesting projections in any ten-year period which exceeds ten percent" shall be deemed substantial and would require modification or amendment. However, the evidence submitted by SPI to date during the first nine years of the first decade of a one hundred year planning cycle suggests that average harvesting has not exceeded ten percent. The indication is that there has been an under harvest of around 15% during this period, and therefore the amendment trigger put forth in the Option "a" has not yet happened. Additionally, the "trigger" in the rules of the BOF has not occurred either; that being "The average annual projected yield over any rolling 10-year period...shall not exceed the projected long-term sustained yield." ((14 CCR Sec. 953.11(a)(2)) In fact, the first "rolling 10-year period" has not even been completed since the Option "a" was adopted in 1999 and the cut to date is running in excess of 15% under projections. Nor has the statement referenced on pg. 32 of the Option "a" been exceeded as that provision states that a greater than 10% deviation from the average annual projected harvest level require a revision of the Option "a" plan. To date, SPI has not proposed to deviate from the annual projected harvest as stated in the approved Option "a" plan and, in addition, as the first decade of plan has not yet been completed, one doesn't precisely know if there has been an actual deviation of either plus or minus 10%.

CAL FIRE has previously discussed the report in the THP on page 115 et seq. concerning a possible 67.9% under estimate of growth in the Response to Concern #16. CAL FIRE is not comfortable with many of these projected factors and would not want to see them used in the Option "a" at this time in order to justify an increase in the annual harvest on these lands. In particular, CAL FIRE requested a reduction of 20% in projections of plantation growth until such time that actual CFI plots can be installed and measured at regular intervals to obtain real growth information as the CACTOS model does not handle these smaller tree sizes well. Additionally, the claimed growth gains of genetically superior trees that have already been planted and that are going to be planted in the future are not yet proven, although intuitively, one would think that this was going to be successful based on experience from superior tree plantings from all over the United States and at the CAL FIRE tree nurseries in the past. Also CAL FIRE notes that there should be growth gains in plantation trees where competition for resources from invading brush species are controlled and where trees are spaced through thinning when compared to normal stands which do not have this kind of management. Any gains from this management will also be measured using the CFI growth data.

As discussed elsewhere in this Official Response, CAL FIRE has allowed inclusion of additional recently acquired lands amounting to an 8.8% increase, but has not allowed increases in annual harvest based on these extra acres. This does not violate the provisions of 14 CCR Sec. 953.11 because there is still not a showing that the cut during the rolling 10-year period exceeds the projected long-term growth. There is no requirement for a landowner to maximize harvest in the rules of the BOF or to produce the most forest products that are possible to grow on their lands. ("Producing the yield of timber products specified by the landowner..." (14 CCR Sec. 953.11)). Also as previously discussed in the Official Response, the possible fertilization effects from increases in CO2 are not yet proven by long-term research, although there has been some preliminary work done in this area, and as such cannot be modeled in the Option "a" pending further information. CAL FIRE finds that the Battles study provides useful insight into the possible effects of global warming on a timbered area that is at least geographically close to the Option "a" timber stands of the plan submitter, but the study is hardly conclusive, as demonstrated in part by the fact that the results have already changed from the first report to the revised Battles report, does not represent the best available information as has been discussed in the THP and in the Response to Concern #15 and elsewhere in this Official Response. From Battles; "Modeling specific impacts of future climate on California's forests is a precarious undertaking." (Battles 2008) From the THP, pg. 115.3; "The purpose of the study was to determine if current models could be used outside of their traditional role and be used to predict potential impacts on yield to potential climate change scenarios without actual real data on either the magnitude of the climate change or the known measured response to trees growing in those conditions." In addition this study has been supplanted by the author in Battles 2009, and these declines are no longer predicted.

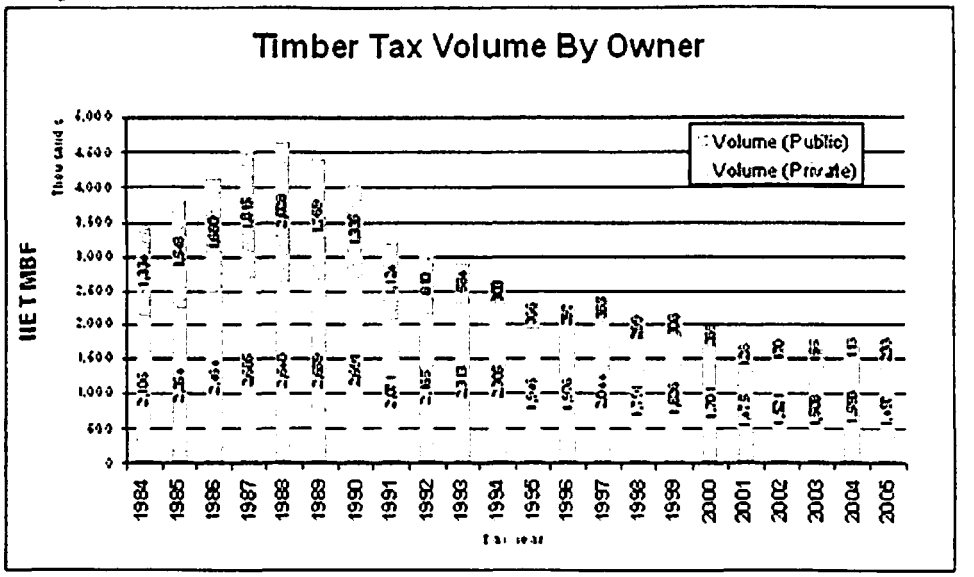
21. **Concern:** It was stated THP 4-08-05 Is Legally Inadequate Because It Fails to Identify, Evaluate and Mitigate the Plan's Cumulative Contribution to Global Warming in that California recognizes the potential significant effects of global warming on human health and the environment as a matter of law. With the adoption of the California Global Warming Solutions Act of 2006 ("AB 32"), state law now recognizes the "potential adverse impacts of global warming" on "the economic well-being, public health, natural resources, and environment of California." (Health & Saf. Code, § 38501, subds. (a), (b); see also Executive Order S-5-05 [recognizing California's "vulnerability to the impacts of climate change" and calling for "mitigation efforts ... to reduce greenhouse gas emissions"]') As a result, the Act requires limiting the emissions of greenhouse gases, including CO^2, at 1990 levels by 2020, reducing such emissions further thereafter. (Health & Saf. Code, § 38550.) As part of the state's effort to limit and reduce emissions of greenhouse gases, the legislature amended CEQA in 2007 by adding a section requiring the Governor's Office of Planning and Research ("OPR") and the state Resources Agency to prepare and adopt CEQA guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions" by January 1, 2010. (Pub. Resources Code, § 21083.05.) Pending adoption of the new guidelines, OPR has issued a technical advisory to lead agencies recommending a three-step approach for complying with CEQA when approving projects: "identify and quantify the GHG emissions [associated with the project]; assess the significance of the impact on

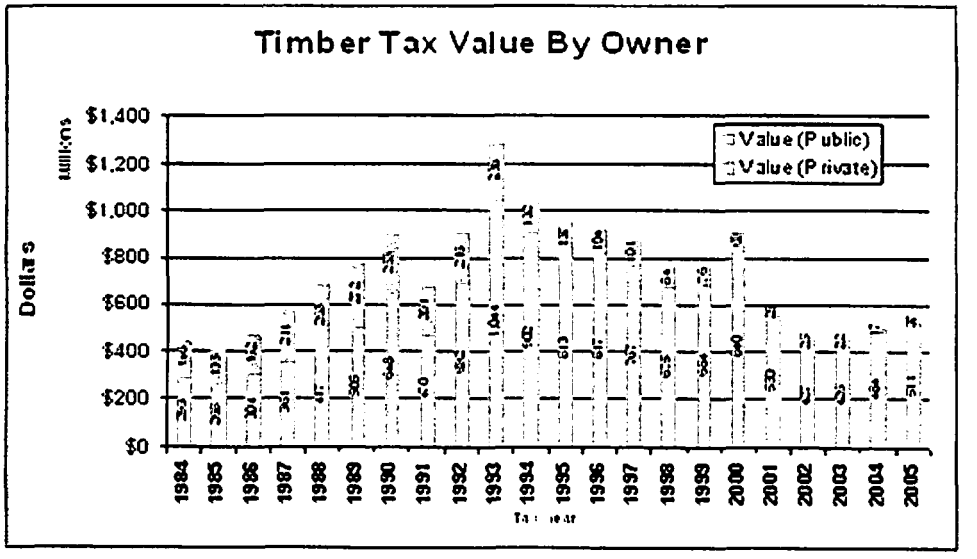
climate change; and if the impact is found to be significant, identify alternatives and/or mitigation measures that will reduce the impact below significance."

Response: In response to AB32, the California Air Resources Board (CARB) adopted a scoping plan in October 2008 which included targets and goals for the management of private timberlands that are under the existing authority of the BOF and made recommendations for public timberlands in California as well. These measures include the maintenance of the current level of carbon sequestration through sustainable management practices including reducing the risk of catastrophic wildfire and avoiding land-use changes that reduce carbon storage. In addition to the negative impacts from the risk of wildfire and land-use change, the ruling pointed out the risk of insect attack on timberlands. The ruling also pointed out that; "The Board of Forestry and Fire Protection, working with the Resources Agency, the Department of Forestry and Fire Protection and ARB would be tasked with developing a monitoring program, improving greenhouse gas inventories, and determining what actions are needed to meet the 2020 target for the Forest sector." This ruling was only adopted in October 2008, and as yet, the Board has not promulgated regulations affecting forest practices in this area, as previously discussed in the Response to Concern #14. In the interim, however, CAL FIRE has examined the elements of the Greenhouse Gas Inventory, the AB32 scoping Plan and the threats identified in the scoping plan relative to the ability of the Forestry Sector to meet the 2020 targets. In evaluating the key elements, four areas were identified. These include 1) harvesting, growing stock levels, and sequestration potential, 2) wildfire, 3) conversions, and 4) mortality related to drought, insects and diseases.

Timber Harvesting – The record of the history of logging in California to examine the changes that have occurred over time in order to determine if it is likely that the level of carbon sequestration in the forest sector can be maintained pursuant to the scoping plan target. For timber harvesting alone, the Board of Equalization, Timber Tax Division, keeps records of the volume of timber harvested in the state because they collect taxes on these amounts to be distributed to various counties. From the BOE; "The average annual volume of 1.96 million MBF in the period 1995-2005 was 53% of the 3.73 million MBF in the 1985-1994 annual average. Since the high in 1988, total volume declined an average of 2.18% per year from 4,688 MMBF to 1,730 MMBF in 2005. Much of this fall off is due to reduced harvest on public lands, which is readily seen in Statewide Summary Chart: Volume. From the chart, it appears that volume had leveled out. Absent a change in federal policy with regard to timber harvest on public lands, harvest on private lands will probably continue to drive the overall domestic supply stream. Economics and regulatory policies will continue to drive the level of harvesting on private lands."
(http://frap.cdf.ca.gov/projects/BOE/BOETimberTax.html).

California Timber Yield Tax Volume and Value Trends





While the BOE findings show a very significant decline of federal harvesting, the BOE chart of harvesting levels from 1978 to 2007 show that harvesting on private lands have also fallen off significantly. From a high of 2,695 MMBF in 1990, the levels on harvesting on private lands administered by CAL FIRE has fallen to 1,440 MMBF, or a decrease of 47%. The take-away message from these statistics is that California's forests have a very good chance of meeting the recently enacted CARB goals by providing more carbon sequestration based on a falling level of harvest when compared to the high point of harvesting which occurred around 1990.

Wildfire - With respect to forest wildfire, while there has been an increasing level of fires burning in California in recent years to totals approaching 800,000 acres in the worst fire/drought years, many of these have not occurred on conifer timberland. A study from the Forest and Rangeland Assessment Program (FRAP) found that the rotation age that that it would take to burn all the conifer timberland in an area of California that included 3,511,343 acres in Amador, El Dorado, Nevada, Yuba, Placer, Butte, Tuolumne and Calaveras Counties would be 825 years. This time period exceeds the likely life cycle of almost every tree species that grow in the mixed conifer forest of this area of the state. This compares to 126 years that it would take to burn all of the brush lands of this area of the state. Comparison of Areas Burned in Developed and Wildland Areas in the Northwestern Sierra Nevada Foothills Vegetation, Wildland/Developed Strata; FRAP; CDF; August 22, 2001). While catastrophic wildland fire has not been a substantially noted to be a factor in reducing the carbon sequestration ability of California's forests in the past as based in this particular study, it must be a goal of the state to continue to provide for forest fire suppression and for timberland owners to manage properties to reduce the likelihood of large catastrophic fires. The current THP provides for forest plantations and for removal of at least some of the accumulation of slash that currently exists on the forest floor. The pattern of scattered forest openings with managed spacing of planted trees and with blocks of trees with various tree crown heights over landscape in approximately twenty acre openings will enhance forest fire suppression efforts when compared to an unmanaged stand with ladder fuels and interlocking crowns and with large amounts of slash on the forest floor.
In the study, "Fire and Fire Suppression Impacts on Forest Soil Carbon" (Page-Dumroese, et al. 2003), "Many ecosystems, particularly in the western USA, are now overloaded with surface fuels that have accumulated from fire suppression. This type of stand condition, with large amounts of surface fuel, is conducive to wildfires and may trigger catastrophic changes in soil productivity if fire severity is high (Sands 1983; Harvey et al., 1999)." Clearly a better alternative to uncontrolled wildfire, at least in a Mediterranean temperate climate, is to have a forest maintained in a condition which promotes good tree spacing and reduction in ladder fuels.

Forest Management as a means of controlling stocking, reducing fire risk, matching tree species to anticipated changes in conditions, responding to insect infestations, etc. can and will be utilized to maintain NPP in managed stands. For forest ecosystems the two greatest vectors that are going to drive change in distribution of vegetation types will be fire and moisture stress attributable to changing precipitation patterns. While total precipitation under most climate change models is predicted to remain roughly the same as the current level, the form of precipitation is expected to shift to a higher proportion of rain as opposed to snow. The result of this shift could be longer periods of time during any one trees' growing season when soil moisture will be at low levels. Combined with the likelihood of more high temperature days, tree mortality levels are expected to increase along with a decrease in regeneration success. In additions, wildfire under all of the modeled climate scenarios is also expected to increase.

Drought and related mortality associated with interplant competition will be just as likely to impact stands of older trees as overstocked stands of young trees. Both a natural and a management adaptation response to provide for resiliency would generally dictate a

reduction in stocking to reduce interplant competition or a species shift. Management would allow for utilization of the material removed, reduce fuel loading, reduce CO2 releases associated with decomposition of dead material, reduce emissions associated with wildfire and provide for wood products that can be substituted for other more CO2 intense building alternatives. Clearly not all acres need to be managed nor will they be to improve resiliency. However, it is the Department's conclusion in balance management will have benefits in terms of improving forest health and resiliency of managed stands and that forest management represents a viable option as part of any adaptation strategy.

Additionally, wildfires will increase in frequency across the landscape. Lenihan et al. (2006) studied the response of vegetation distribution, carbon and fire to three future climate change scenarios for California. Their conclusions in the abstract of their report regarding fire were: "Total annual area burned in California increased under all three scenarios, ranging from 9%-15% above the historical norm by the end of the century. Regional variations in the simulated changes in area burned were largely a product of changes in vegetation productivity and shifts in the relative dominance of woody plants and grasses. Annual biomass consumption by fire by the end of the century was about 18% greater than the historical norm under the more productive PCM-A2 scenario. Under the warmer and drier GFDL scenarios, simulated biomass consumption was also greater than normal for the first few decades of the century as drought-stressed woodlands and shrublands burned and were converted to grassland. After this transitional period lower than normal NPP produced less fuel, and biomass consumed was at or below, the historical norm by the end of the century under the GFDL scenarios".

Lenihan also notes the considerable uncertainty that exists with respect to the modeling and assumed trajectories of the future greenhouse gas emissions.

The effects of wildfire in terms of increasing forest fire severity in the Sierra Nevada and southern Cascade Mountains of California were also quantified by Miller et.al. (2008). Their conclusions indicate that fire intensity is increasing over time and that for the areas for which data was analyzed: "In our study area, forest types most affected by increasing fire severity are those which 1) form the majority of the National Forest land base; 2) support most remaining habitat for a suite of old-forest obligate carnivores and raptors...3) see the heaviest resource extraction and recreation use, and 4) are experiencing rapid growth in human populations...."

Based on Miller's conclusions increasing fire severity can be expected in both older stands and those which are subject to resource extraction. Miller recognizes that use of fire in Yosemite were limiting fuels and reducing the probability of fire recurrence. While this may be a viable management strategy for maintenance of older stands, use of fire does result in emissions. Without the use of fire the probability of any given stand including old stand experiencing a fire event over the next century is high. As was observed in the Miller study the probability of a stand replacing fire is increasing.

Oneil, et.al. studied the sequestration emission outputs for unmanaged stands in Eastern Washington. His conclusions regarding the carbon storage, sequestration, and emissions

relationships for the stands analyzed was as follows: "Federally managed forests produce a different set of carbon related issues. If we assume no harvest, no fire and no insect and disease impacts on national forests in eastern Washington, the carbon sequestration potential of these forests is approximated by Figure 1. However, McKenzie et al. (2004) indicates that we can expect at least a doubling of fire frequency and extent in eastern Washington. Linking this research to work done by Camp on the historic levels of fire refugia (i.e. the area that didn't burn under historical fire conditions) suggests that under the most optimistic climate change scenarios approximately 1.7% of the acres of national forest's in eastern Washington would burn in each decade. Using this 1.7% as a 'back of the envelope' calculation would generate the forest carbon footprint given in Figure 2. Figure 2 gives what we would hope is an upper bound of the carbon release potential if these forests burn at rates predicted by recent climate change research. If the forests burn at rates higher than anticipated under climate change scenarios, then there would be more emissions from these forests. In this rough approximation, regeneration is not estimated as regeneration delays and failure rates would need to be more accurately estimated. That 'black' component would be residual burned wood that decays, and thus releases carbon, at a rate of approximately 0.5 tons/carbon/acre/year. The grey component is the equivalent emissions released from the burned forest based on 6 tons/acre emitted for every acre burned (Mason et al. 2003). While this is a very cursory examination of potential impacts which is in need of much refinement, it does highlight how unmanaged forests are likely to become a source of carbon emissions rather than a sink."

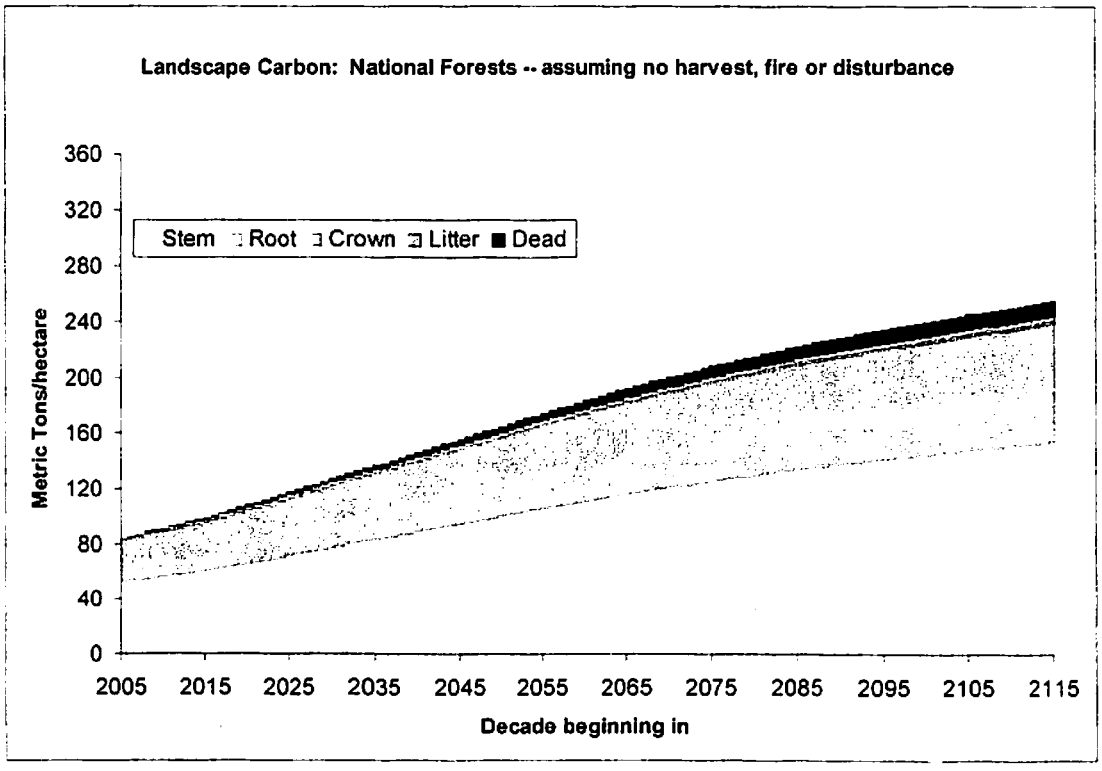


Figure 1: Tons per hectare carbon pools for national forests in eastern Washington assuming no management

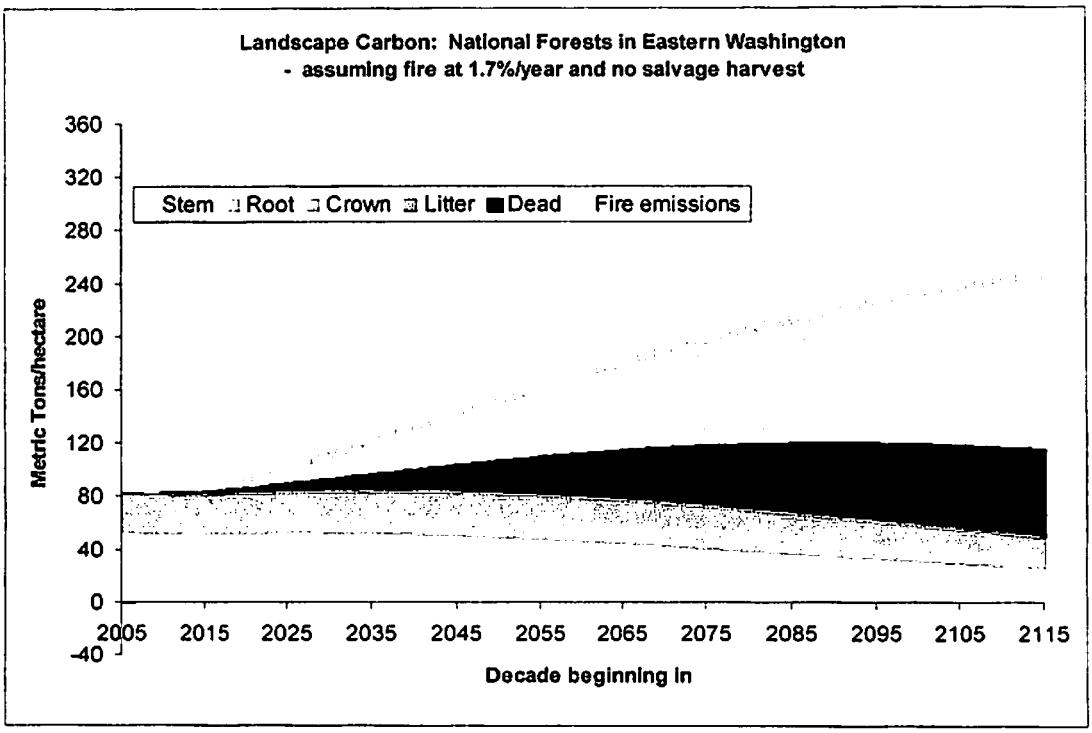


Figure 2: Tons per hectare carbon pools for national forests in eastern Washington assuming a 1.7% burn rate based on climate change estimates

While these examples have been developed for Washington forest types, the general relationships for California species will likely be similar for our drier forest types. It is the Department's conclusion that a strategy designed to maintain large old trees without managing the associated understory fuels is not the best model for either improved resilience to wildfire or reduce greenhouse gas emissions associated with wildfire in the reserved areas. However, the tradeoffs are largely policy calls which are outside the scope or influence of the THP project and the plan submitter's control.

For stands where forest management will occur, the relationship between post harvest condition and fire behavior is relatively well understood and forest management applications that appropriately address fuel hazard considerations can create conditions favorable to stand survival. The basic science and recommendations for post harvest conditions have been described in Morris, et al. (2007) "Guide to fuel treatments in dry forests of the Western Unites States: assessing forest structure and fire hazard". The types of stands to be created under through forest management regime will lend themselves well to fuel

reduction prescriptions described in the guide and that management regimes, if applied, will support both forest health as well as resiliency from a wildfire standpoint. It is the Department's conclusion that the even-aged management regime will likely afford more options for management applications that will enhance forest health, resistance to wildfire, and ecosystem resiliency.

Conversions - While the BOF regulates timberland conversions so as to keep as much timberland in forest cover as possible, some conversions are inevitably approved by CAL FIRE. One of the goals of the state should be to provide economic incentives for landowners to keep timberland in production so that it will be more profitable to produce an even flow of timber products rather than to find other more profitable uses for their property. ("The Legislature thus declares that it is the policy of this state to encourage prudent and responsible forest resource management calculated to serve the public's need for timber and other forest products, while giving consideration to the public's need for watershed protection, fisheries and wildlife, and recreational opportunities alike in this and future generations." PRC Sec. 4512(c)) From a FRAP report that studied the number and kind of conversions approved by CAL FIRE; "Between 1969 and 1998, approximately 113,000 acres were converted from private timberland to other uses. Conversions on lands categorized "timberland" under the Forest Practice Act include lands with or without Timberland Production Zone (TPZ) classification. Land was converted to a variety of uses, including grazing, development, and vineyards. Prior to 1980, the main purpose of conversion was grazing. Since then, conversion to subdivisions has been the main purpose. The impact of conversions on timber supply is not significant, but in many local areas, conversions are a major land use issue. Timberland Conversion in California from 1969 to 1998 Technical Working Paper 1-01-02; FRAP; CDF)" While this would appear to be an "even-flow" rate of about 3767 acres per year, an examination of the actual rate of conversion shows that most of the acres were converted in about the first six years of the study. From a high of nearly 20,000 acres of timberland conversion in 1970, the number of acres in 1998 fell to under 1000 acres. From this report, it appears that timberland conversion should not be a large threat to the continuing ability of California's forests to sequester carbon.

Drought and Related Insect and Disease Impacts - With respect to the role of insects (and pathogens) to become a threat to the ability of California's forests to meet the AB32 CARB goals of continuing to sequester carbon, there have been recent outbreaks of extensive insect damage from bark beetles in the mountains of southern California. Whether this condition has been caused by climate changes, ozone pollution, the normal cycle of drought that has always been a factor in a Mediterranean climate, or is the result of poor management practices and a lack of proper tree spacing is a matter of conjecture. In southern California, CAL FIRE once had a very active insect control program that attempted to capture infested trees while the insect brood was still present and treats them with mechanical or chemical means before the insects could mature and spread. This program has largely been the victim of budget cuts and all of the chemical means to control insects have been eliminated for political, environmental or economic reasons. Additionally, the

lumber mills that used to service the area, the Big Bear Lumber Company and the L-P mill at Inyokern, have vanished because of the decline of the availability of federal timber and no longer are nearby in a position to provide for economic tree spacing when stand conditions become too crowded with competition for available water and soil resources. (Local knowledge) The BOF has rules to allow for rapid response to insect and disease conditions through vehicles such as Exemptions and Emergency Notices, and encourages the use of the Sanitation-Salvage silvicultural method where it can be helpful to clean up these unhealthy conditions. One of the purposes of silviculture is to provide for an appropriate harvest method that will treat the existing timber stand in a way that will convert it to a sustainable forest condition as quickly as possible and to pave the way for the area to grow a healthy future crop of trees. As explained in the plan, the current THP proposes the use of even-age methods that are closest to a clearcutting because the current stand is not growing to its potential after a hundred years of selective management where the genetically superior trees were removed repeatedly. The replacement stand should be in a better position to resist insect and disease attacks and the fact that the replacement stand will be thinned over time to regulate tree spacing should aid in meeting the CARB goal of forest sustainability. It is not known if the other forestlands of California, such as the public timberlands that are not in the control of CAL FIRE and the BOF, will be impacted by forest insects in the way that the southern California forests have been in recent years.

22. **Concern:** It was stated THP 4-08-05 Is Legally Inadequate Because It Fails to Identify, Evaluate and Mitigate the Plan's Cumulative Contribution to Global Warming in that CEQA and the Forest Practice Regulations require CDF to ensure that approved THP's identify and consider cumulative impacts which compound or increase other environmental impacts. CEQA requires public agencies to identify the potentially significant effects on the environment of projects they intend to carry out or approve, and to mitigate significant effects whenever it is feasible to do so. While AB 32 did not amend CEQA to require new analytical processes to account for the environmental impacts of GHG emissions from projects subject to CEQA, it does acknowledge that such emissions cause significant adverse impacts to human health and the environment. (OPR Technical Advisory, p. 3.) Because state law, through AB 32, recognizes the significant impacts of GHG emissions on health and the environment, lead agencies must consider the cumulative contribution of proposed projects to those significant impacts from GHG emissions. "Both CEQA and the Forest Practice Act require that a THP include a cumulative impact analysis." (Joy Road Area Forest & Watershed Assn. v. California Dept. of Forestry & Fire Protection (2006) 142 Cal. App 4th 656, 675.)13 Where "a fair argument exists that significant ... cumulative impacts will result from timber operations," the THP must consider those impacts and include alternatives and/or mitigation measures to reduce them. (Friends of Old Trees v. Dept. of Forestry and Fire Protection (1997) 52 Cal.App.4th 1383, 1395-1396). Based on the considerable scientific evidence that logging - and particularly clear-cut logging such as that proposed in THP 4-08-05 -leads to significant net releases of CO^2 into the atmosphere, there is a sufficient "fair argument" here to warrant revision of THP 4-

08-05 to include an analysis of the plan's cumulative impact, together with SPI's other logging operations, on overall GHG levels.

Response: The Department has worked with the Air Resources Control Board (ARB) to assist with development of the 1990 baseline for the Forest Sector and assisted ARB with workshops and liaison with the Board of Forestry and Fire Protection as part of the AB32 Scoping Plan development. The Scoping Plan was adopted in December of 2008 and establishes a 2020 target for the Forest Sector of 5 million metric tons of carbon sequestration. Achievement of this target will require that the Sector maintain present estimated levels of net sequestration. Essentially this represents a no net loss strategy for the Forest Sector as a whole. Management regimes which maintain or increase inventory and growth will contribute to this objective. As we have discussed in previous responses regarding the Option "a" document, the Department has concluded that the estimates of inventory increase and growth for SPI's timberland are reasonable and that net sequestration over time will increase in support of the AB 32 target. Adoption significance threshold in this case is not necessary given that the management regime will result in a net benefit from a climate standpoint. (see also the Response to Issue #21) It should be noted that the concept of a threshold of significance is established in order for a lead agency to make a decision regarding at what level of an issue to require an analysis of that issue in a CEQA document. Since this functional equivalent process already contains the CEQA analysis of GHGs, the issue of a threshold of significance is moot.

The FPA recognizes the need to balance forest management objectives with other resource values including air quality. For the Forest Sector AB 32 sets a general goal of 5MMTCO2E for 2020 and establishes a threshold concept necessary to achieve this objective of maintaining current levels of carbon stock. The Scoping Plan also recognizes that the overall greenhouse gas inventory needs refinement and that monitoring will provide a key role in tracking inventory. From a CEQA perspective, based on adoption of AB32, air quality as it relates to activities conducted under the FPA needs to be considered. The overall target for the Forest Sector has set an objective based on maintaining current carbon stock to support maintenance of a 5MMTCO2E Sustainable Forests target.

Monitoring data from the United State Forest Service's report entitled "California's Forest Resources, 2001-2005 Five Year Forest Inventory Report (FIA)" (Christensen, et. al, 2008 PNW-GTR-763) provide the most current information on inventory trends for California Timberlands. Current Gross Growth on all ownership groups indicates that inventory is increasing across all ownership groups at approximately 0.8% per year in terms of cubic feet of inventory.

The inventory is reported by various sectors including National Forests, State and Local Government, Corporate Private, and non corporate private. With the exception of the Corporate Private the other three reporting categories are showing net increases in inventory. For the non-corporate private sector in the inventory, the data indicate that current annual growth for the period is increasing at approximately 0.3 percent per year. For the corporate private growth is balanced.

The monitoring trends reflected in the report indicate that non-corporate private timberlands for the period reported are continuing to build inventory under past practices and it is reasonable to assume that these trends will continue. Adverse impacts associated with harvesting on these timberlands are not anticipated. However, given the error bar around the estimates of growth continued monitoring at the FIA level will be necessary to track performance of the non-corporate sector. Monitoring at the state level to track performance of non-corporate landowners is the most appropriate scale. Monitoring is not appropriate at the individual THP level as it is unreasonable to expect that speculative estimation by plan submitters would provide a reasonable mechanism for tracking performance of the Forest Sector and should also be useful in tracking the cumulative effects of management decisions made relative to the Forest Sector. As long as the monitoring determines maintenance or increases in carbon stock, timber harvesting activities in this landowner category will not have an adverse impact on GHG targets for the sector.

For the Corporate category, the FIA data indicate that growth and harvest are essentially balanced. Again, the error bars around this estimate are large. Since the landowners represented in this FIA category also comprise the landowners in the state with greater than 50,000 acres, the Department has evaluated the inventory trends reported in the Long-Term Sustained Yield Documents the Department has on file (see Table below). These documents indicate that for most landowners and the management regimes selected, inventory is increasing and will support the 2020 Scoping Plan Goals. Since the inventory estimates for these landowners are based on a significantly greater number of inventory plots than the FIA inventory, it is likely that the net growth estimates for the individual landowners is more accurate than the FIA estimate. Monitoring and tracking for this landowner group will be important as the acreage in this category will be most likely represent the component of timber management activities which will either positively or negatively impact inventories. This ownership category is also most closely associated with milling capacity and would be most likely to benefit from carbon pools associated with wood products in-use, substitution, and products in landfills.

From a carbon sequestration perspective, the LTSY calculations for an ownership are indicative of carbon stock (timber inventory) and rate of sequestration (growth). The Department's review of approved LTSY documents for the larger landowners in the state indicates that at the end of the 100-year planning horizon required in the Forest Practice Rules that the total inventory (carbon stock) and growth (sequestration rate) will exceed existing inventory and growth levels. In addition, over the 100 year period analyzed wood products represented through projected harvest levels will result in sequestration in use as well as wood products in landfills. In combination with substitution benefits when comparing wood products to other substitute building materials, greenhouse benefits attributable to the management regime selected by larger landowners do not in the Department's judgment represent an adverse impact but rather will benefit both carbon storage and sequestration. As such additional mitigations to address the impacts of this plan on climate change have not been determined to be necessary.

The Department recognizes that the forests of California are an important component of the State's efforts under AB 32 to mitigate climate change impacts of CO2 relative to climate

change. The 2003 Forest and Range Assessment (FRAP, 2003) establishes a goal to "acquire and develop data and information on global climate change for use in reducing or mitigating the production of greenhouse gasses including net reductions through the management of natural forest reservoirs (paraphrased fro Cal. Public Resources code Section 25730, climate Change Inventory and Information)." In cooperation with the Resources Agency, Board of Forestry and Fire Protection, Air Resources Control Board, California Environment Protection Agency, California Energy Commission, Bio-energy Interagency Working Group, the United States Forest Service, Biomass and numerous other local, state and federal entities, have been working to improve working knowledge of the role of California's forests.

Forest land management will play a major role in climate change. The forests of California will both effect and be affected by climate change. The California Forest Resources, 2001-2005 Five Year Inventory and Analysis Report (Christensen, et. al., 2008) shows an inventory of 2,184 million bone-dry tons of above ground biomass representing an estimated mass of 1,102 million bone-dry tons of stored carbon for all forest landowners in California. The 2003 FRAP Assessment estimated that the annual growth on timberlands was 70 per cent of potential growth capability and also recognize a declining trend in harvest. The declining trend in harvest is also noted in the Forest Service's Forest Resources Report (Christensen, et. al., 2008) noted continuation of this trend.

Based on summaries of the 2008 Forest Inventory Assessment (Christensen, et. al, 2008) for California's forests, recent inventory data nor harvest trends indicate that disturbance from logging when measured over a long period needs to be reduced. Growth on public ownerships and non-corporate private ownerships is greater than removals attributable to harvesting and mortality. For corporate ownerships, growth and harvests are essentially balanced in the FIA data.

The Department also reviewed LTSY projections for the 2020 and 2050 periods for these landowners and it indicated that inventories are expected to increase. Given the LTSY projections for the larger landowners, the trend indicated in the FIA data relative to increases in growing stock volume and growth through 2050 is likely to continue.

The Department recognizes that growth on California's forested landscapes remain below the potential productivity (FRAP 2003). Forest management through aggressive reforestation, enhancement of conifer site occupancy, genetic improvement, thinning, etc. can and will improve productivity on managed lands while balancing other resource values and providing positive benefit from a climate perspective. This positive benefit will come from increased inventory (carbon stock), increased growth (sequestration) and, storage in wood products and landfills, as well as substitution benefits attributable to forest management life cycle analyses.

Based on these various inventories and projections, the Department does not anticipate a significant impact on carbon sequestration attributable to forest management. The Department recognizes that the inventories in the current LTSY projections for the larger landowners reflect bole-wood measured in millions of board feet. Impacts on other carbon pools are not reflected in either these estimates or the FIA estimates. It is reasonable to

conclude that forest management practices that lead to increases in bole-wood volume will also have positive benefit to other forest, in-use, landfilled, and substitution relationships.

Based on this review and independent analysis as discussed throughout this Official Response, it is the Department's conclusion that the forest management regimes planned by the various landowners under the provisions of the Forest Practice Act and associated Forest Practice Regulations, will have a beneficial impact on greenhouse gas mitigation efforts under AB32 through improvement of growing stock levels (carbon stock) and growth rates (sequestration) over the timeframes specified under the Forest Practice Act and Rules. Further, for ownerships that propose to utilize clearcutting silvicultural regimes with rotation ages that meet or exceed the provisions of the Forest Practice Rules, sequestration rates and growing stock levels will provide levels of sequestration comparable to unmanaged stands when the benefits of wood products in use, wood products in landfills, and substitution are factored into the overall Life Cycle Analysis. As such, mitigation to avoid an adverse climate impact associated with the management regimes specified in the Long Term Sustained Yield Option "a" analyses associated with this plan, in consideration with other closely related plans, was determined not to be necessary.

23. **Concern:** It was stated THP 4-08-05 Is Legally Inadequate Because It Fails to Identify, Evaluate and Mitigate the Plan's Cumulative Contribution to Global Warming in that Scientific research indicates that even-aged management, such as that planned in THP 4-08-05, cumulatively impacts global warming through substantial net carbon releases into the atmosphere. The scientific evidence regarding the impacts of timber harvesting on climate change indicates that harvesting leads to significant net releases of CO^2 into the atmosphere, particularly where harvesting methods lead to disturbance of the forest floor and soil structure. As one forestry scientist recently noted in comments to the California Air Resources Board regarding the California Climate Action Registry Forest Protocols: Timber harvest, clear cutting in particular, removes more carbon from the forest than any other disturbance (including fire). The result is that harvesting forests generally reduces carbon stores and results in a net release of carbon to the atmosphere. This view is borne out by scientific models indicating that the amount of carbon sequestered in U.S. forests generally is decreasing due primarily to the relatively large increase in harvest levels on private lands since the 1990's. These same models indicate that U.S. forests are capable of sequestering up to 15 Tg^{16} per year of carbon where alternative forest policies emphasizing afforestation are assumed. A 2002 study indicates that logging removes up to 95% of the non-soil carbon stored in a forest ecosystem, and that half of this amount is released into the atmosphere in the first year. This research is supplemented by a study, based on analysis forest carbon in the United States from 1910 to 2000, showing that 71 % of the carbon harvested during that period was released into the atmosphere, while only 17% was stored in wood products. In addition to the net releases of non-soil carbon caused by logging, clear-cutting in particular leads to substantial releases of carbon stored in forest soils and floors. Over half the carbon stored in U.S. forests is contained in the forest floor and soils. Three scientific studies note that disturbances from logging lead to significant releases of carbon stored in soil organic matter. This is because harvesting biomass disturbs the soil while simultaneously changing the

microclimate. As a result, one of the studies indicates that logging causes significant net releases of carbon from the forest floor and soils: "Nationally about 2/3 of the historical and projected positive flux is carbon buildup in the soil and forest floor. ... A search of the literature indicated that a major forest disturbance such as a clearcut harvest can increase coarse litter and oxidation of soil organic matter. The balance of these two processes can result in a net loss of 20% of the initial carbon over a 10-15 year period following the harvest (Pastor and Post 1986, Woddell et al. 1984)." Researchers have also quantified these releases. One study finds that "reductions in soil Carbon stocks over 20 years following clear cuts can range between 5 and 20 t C/ha. A similar study found that even when considering storage of carbon in timber products, the conversion of 5 million hectares of mature forest to plantations in the Pacific Northwest over the last 100 years resulted in a net increase of over 1.5 billion tons of carbon in the atmosphere. In addition to the carbon stored in soils and the forest floor, mature forests also store significant amounts of carbon. In rebuttal to timber industry claims that old-growth forests are "carbon neutral", a recent scientific paper concludes: "Our results demonstrate that old-growth forests can continue to accumulate carbon, contrary to the long-standing view that they are carbon neutral. Further research indicates that old-growth forests store up to four times more carbon than young and middle-aged forests. Considerable research notes that clear-cutting is the most destructive harvesting method to forest carbon stores. This research indicates that it takes more than 150 years for a cut-over forest to produce the amount of living and dead biomass that exists in an old-growth forest. The same study shows that managed forests, clear-cut on an 80-year rotation, store only half the carbon of old growth forests. Another study based on a model quantifying carbon in various types of U.S. forests found that clear-cutting causes significant carbon releases from the forest floor because the practice reduces litter input while increasing decomposition. Lastly, a number of scientific studies have assessed timber industry claims that forest regeneration through plantations and carbon storage in wood products offsets the aforementioned carbon releases caused by logging. These studies indicate that carbon uptake by young trees in plantations and re-growth forests does not compensate for the amount of carbon presently stored in natural forests that would be lost if they were harvested. Thus, transforming old-growth forests into plantations results in losses of up to 50% of total ecosystem carbon. As one study concludes: In fact, young forests rather than old-growth forests are very often conspicuous sources of CO^2 because the creation of new forests (whether naturally or by humans) frequently follows disturbance to soil and the previous vegetation, resulting in a decomposition rate of coarse woody debris, litter and soil organic matter (measured as heterotrophic respiration) that exceeds the NPP (net primary production) of the regrowth. Additional studies refute the timber industry's claim that increased harvesting more than offsets CO^2 releases due to the storage of carbon in wood products. These studies show that after logging, only a small fraction of the total carbon stored in a forest ecosystem is turned into forest products like paper and lumber, and many of these products decay quite quickly. In sum, considerable scientific evidence indicates that cut-over lands emit significant amounts of carbon compared to uncut forests. As a result, when reviewing harvest plans like THP 4-08-05, CDF should

assess the related net amount of CO^2 released into the atmosphere and its cumulative impact on the state's total GHG emissions as regulated under AB 32.

Response: The concern above cites comments made to the ARB that clearcutting removes carbon from the forest and that replacement forest plantations do not sequester carbon at a rate equal to the stored carbon in the trees that are removed. However, the statement is general in that the fate of the removed trees in the form of forest products must be considered as well as the rate of growth of the forest stand in comparison to the rate of growth of the replacement plantation. The letter cited goes on to state: "In the Forest Protocols wood products are treated as an optional carbon store. I believe this is completely appropriate for several reasons. While it is true that some of the carbon harvested from a forest is stored for a period of time it is not the case that this material is stored forever. Similar to other forest-related pools, it is the balance of inputs versus outputs that determines whether the wood products pool is increasing or decreasing. (M.E Harmon, 2007)." The plan itself notes that the existing stand is not growing at full potential. One benefit from removal of this particular type of forest stand is to replace it with faster growing, genetically improved trees. As stated in the comments to the ARB, "There is a grain of truth to the assertion that forests at a relatively young age do have the potential to take up more carbon than older forests. But it is also true that forests younger than this optimum age also take up less carbon. (M.E Harmon, 2007)." As stated in the study "Two Decades of Carbon Flux from Forests of the Pacific Northwest" regarding the ability of plantation trees to sequester carbon, "Although forest succession processes in the region are beginning to be understood, the mechanisms are complex and interactive. Under the natural regeneration regime that was common before the 1970's, closed-canopy conifer forests were expected to emerge approximately 30-40 years after harvest. The now-common intensive forest planting regime, which involves immediate planting of improved genetic stock and timely hardwood and brush control, has narrowed the estimated time to closed-canopy conifer condition to as little as 20 years. Thus, barring regeneration failure, most forests currently in an early-successional condition due to harvest activity are expected to return to closed-canopy conifer condition within the next two decades. (Cohen et.al., 1996)"

The question of whether or not clearcutting of an individual acre will have an adverse impact is best answered through a Life Cycle Analysis approach. The Department recognizes that Life Cycle Analyses utilizing even-aged silvicultural systems have not been done for California species. In the absence of California specific LCAs, the Department reviewed LCA results for conifer species managed under short rotation even-age harvesting regimes (Birdsey and Lewis 2002, Oneil et al 2007). In both cases the rotations evaluated were generally shorter than those which will be utilized by California timberland owners. In both cases the trends in carbon accumulation over one or a series of rotations show increasing sequestration. The Oneil data trends when the impact of substitution is factored in showed high levels of accumulated carbon and avoided emissions. Although wood product substitution does not permanently eliminate carbon from the atmosphere it can and does offset the use of more GHG-intensive fuels.

When leakage to account for replacement of wood products foregone from these stands as well as wildfire are factored into to a life cycle analysis, it is likely that unmanaged stands

may show a net emission at some point in the future. From a policy perspective this may be an appropriate decision based on other resource or societal considerations, but it should not be assumed that from a GHG perspective that a decision to forego management of a forest stand is the best choice from a global warming and greenhouse gas reduction perspective.

Quoted from the report "A Carbon Budget for Forests of the Conterminous United States" is the following regarding the fate of carbon releases after harvesting; "Immediately after harvesting, woody debris is the largest pool. After one or two decades, woody debris has declined and the tree carbon pool has surpassed it. (Turner et. al., 1995)." While there was a concern stated in the above that removal of the trees themselves during harvesting comprised a large loss of stored carbon, the report "A Carbon Budget for Forests of the Conterminous United States" shows that, "Half of the total timberland carbon is in the mineral soil. Tree carbon, which includes coarse roots, is the next largest component at 33%, followed by woody debris (10%), forest floor (6%), and understory (1%), (Turner et. al., 1995)." However, looking at these percentages, the coarse root carbon is not removed from the site during harvest, the soil carbon is not entirely depleted during logging or reforestation, woody debris are often burned or left on site and incorporated into the soil, and the tree bole itself is turned into a product that continues to sequester carbon until it decomposes over time. There is a statement that "The carbon uptake associated with net annual growth is 331 Tg, however, much of that is balanced by harvest-related mortality (266 Tg) and decomposition of woody debris. The forest land base at the national level is accumulating 79 Tg/yr, with the largest carbon gain in the Northeast region. (Turner et. al., 1995)." Our forests continue to sequester large amounts of carbon, and in some cases, the private forestlands are doing a better job of sequestering that the public forests: "In the Pacific Northwest (West), where the age-class distribution on public lands was taken into consideration, private lands accounted for 65% of the net uptake but only 45% of the total timberland area. That difference is due to the greater productivity of the younger stands, which characterize private lands in this region. Sessions (1991) reported that 40% of the total area of public timberland in Oregon was greater than 150 years of age, while the comparable value for Douglas-fir stands on forest industry lands was about 5% (Turner et. al., 1995)."

The letter of concern as shown in Issue #23 above has the following quote which by implication is supposed to be from Turner et. al.: "These same models indicate that U.S. forests are capable of sequestering up to 15 Tg[16] per year of carbon where alternative forest policies emphasizing afforestation are assumed." This quote does not seem to appear in Turner et. al. 1995, and even if it did appear there and was factual, the quote does not apply directly to the situation found on SPI's timberlands because it applies to afforestation rather than reforestation. The SPI project is starting with timberland and maintaining the same, while the afforestation situation would apply to areas not previously growing trees that were going to be converted to timberland. The quote, however, does show that additional gains in carbon sequestration can be made in the coterminous U.S. by planting areas that are not currently growing timber.

The Issue #23 above goes on to state the following sentence attributed to Janish & Harmon, 2002; "A 2002 study indicates that logging removes up to 95% of the non-soil

carbon stored in a forest ecosystem, and that half of this amount is released into the atmosphere in the first year." However, a careful reading of Janish & Harmon, 2002 shows that this statement did not come from this 2002 study, but was from other sources. The percentage of C loss was shown to disappear in the Net Ecosystem Productivity (NEP) curve when it was assumed that there was an initial condition where all coarse woody debris (CWD) was "assumed to be oxidized or moved off-site during clear-cutting, (Janish & Harmon, 2002, pg. 85)." Remembering that; "Half of the total timberland carbon is in the mineral soil. Tree carbon, which includes coarse roots, is the next largest component at 33%, followed by woody debris (10%), forest floor (6%), and understory (1%), (Turner et. al., 1995).", one notes that the 95% that is said to be removed is from the 50% of the C that is stored in the forest ecosystem; and that further, the CWD is not entirely removed as the coarse roots and stumps are kept onsite and at least some of the limbs, branches, needles and duff is incorporated into the soil or burned in slash piles which are then converted to long-lasting charcoal carbon sources. It should also be noted that Scenario 1 shows no loss of NEP with immediate recovery, a situation that is not very likely, while Scenario 2 through 4 show more likely conditions where there is a loss of NEP for a time and then eventual strong recovery periods which vary from just a few years time to as many as fifty years time. (Fig. 5,6,7,8; Janish & Harmon, pgs. 84 & 85).

A quote submitted in Issue #23 from Skog & Nicholson, 2000 was that "This research is supplemented by a study, based on analysis forest carbon in the United States from 1910 to 2000, showing that 71 % of the carbon harvested during that period was released into the atmosphere, while only 17% was stored in wood products." However, it should be noted that this time period of 1910 to 2000 included lengthy periods of lesser technology and different uses for forest related products. Note, for example, a period of time early in the 20th century when fuelwood was so very common as a way of heating homes and where wood waste was burned in "teepee" burners at the lumber mill instead of being turned into landscape products such as sawdust, bark and shavings. Note also the transition from lumber being made with large diameter circular saws to more modern tools and the transition from dimension lumber to plywood and eventually the very common use of oriented strand board (OSB) made from chips and scraps of wood and used in long-standing commercial buildings and homes. From the same report; "If, when taken out of use, products are disposed of in a modern landfill, the literature indicates that they will stay there indefinitely with almost no decay." And "Prior to 1972, most materials were placed in dumps, where a proportion was burned and contents were more exposed to oxygen and decayed more completely. Legislation then required that dumps be phased out by 1986. Since then, materials have been placed in landfills. Materials in landfills are periodically covered, which prevents oxygen from entering. (Skog & Nicholson, 2000)." The report also notes much more wood is burned for energy in modern times, thus offsetting use of non-renewable fossil fuels. Finally, the summary of the report asks the following questions: "How much would emissions from forest fires decrease due to reduction in fuels available for fires? (Skog & Nicholson, 2000)". For the California Mediterranean climate condition, this may be the all important question as wildfires are capable of consuming vast acres of forest at a time with immediate releases of carbon to the atmosphere. While is it difficult to prove a negative, i.e. fires prevented or carbon releases prevented by removal of forest biomass through harvest, it is true that a tree removed and made into a forest product is a tree that is not available to be consumed in a forest wildfire. And while it is inappropriate to

carry that theory to the extreme, it is likely to be important to carbon sequestration in California to manage a forest in a way that reduces large scale fire potential by reducing ladder fuels, thinning through harvest or having blocks of areas of lower stand density or lower tree crown heights which in turn offer less resistant for controlling the spread of wildfires.

Stated in the Issue #23 above was a quote from Birdsley & Heath (2007) as follows: "Nationally about 2/3 of the historical and projected positive flux is carbon buildup in the soil and forest floor. ... A search of the literature indicated that a major forest disturbance such as a clearcut harvest can increase coarse litter and oxidation of soil organic matter. The balance of these two processes can result in a net loss of 20% of the initial carbon over a 10-15 year period following the harvest (Pastor and Post 1986, Woddell et al. 1984)." This, however, turned out to be a partial quote as the entire quote from pg. 3 of the study follows: "Nationally about 2/3 of the historical and projected positive flux is carbon buildup in the soil and forest floor. ... A search of the literature indicated that a major forest disturbance such as a clearcut harvest can increase coarse litter and oxidation of soil organic matter. The balance of these two processes can result in a net loss of 20% of the initial carbon over a 10-15 year period following the harvest (Pastor and Post 1986, Woddell et al. 1984), **although a recent review suggested that the net effect may be less or even positive in many cases (Johnson 1992).** (from Birdsley & Heath, 2007)." The same study that was purported to be so negative in regards to clearcut harvest also quoted: "After the initial 20% loss of soil carbon after harvest, it was assumed that soil carbon would return to pre-harvest levels by age 50 in the South and 55 elsewhere. (Birdsley & Heath, 2007)." It is noted that the projected rotation age of plantation stands for this particular THP and for the SPI Option "a" are well beyond the 55 year stats used in the study. This study also states that "Between 1952 and 1992, carbon stored on forest land in the conterminous U.S. has increased by an estimated 11.3 billion metric tons. This is an average of 281 million metric tons of carbon sequestered each year over the 40-year period, an amount that has offset about one fourth of the U.S. emissions of carbon to the atmosphere. (Boden et al., 1990)" (from Birdsley & Heath, 2007, pg. 7). U.S. forests are contributing greatly to CO_2 sequestration, even at a time prior to 1992 when timber harvest levels in the west and California were high compared to current levels as discussed elsewhere in this Official Response.

Regarding releases of carbon stored in soil after harvest, not all studies have come to the same conclusion as the three studies quoted in Issue #23. The report "Soil Carbon Accounting and Assumptions for Forestry and Forest-Related Land Use Change" was the following comment: "Recent scientific studies indicate that harvesting may influence soil carbon, an initial slight increase followed by a decrease, and finally an increase. We speculate that soil carbon will eventually return to pre-harvest levels (Heath and Smith, 2000)". Where the three cited studies largely quote results from old-growth forest logging, Seely et al. states the following: "Old-growth forests, in contrast, typically contain significant quantities of soil-organic-matter (SOM). These forests are more susceptible to losses in organic carbon following harvest and conversion to managed stands. (Harmon et al., 1990; Johnson, 1992; Schulze et al.., 2000)." (from Seely et al., 2002) This may explain the losses recorded in the three cited studies, and by comparison, the current timber harvesting plan does not contain old-growth forest conditions and has been harvested numerous times over the past hundred years or so.

Soil C is also discussed in the study "Effects of Forest Management on Soil C and N storage: meta analysis". (Johnson & Curtis, 2001) As stated in the study, "Seventy-three observations from 26 publications were included in the harvest effects database. ...This summary shows that forest harvesting, on average, had little effect on soil C or N in A horizons and whole soils. ...The overall average percent change in C and N, compared to control or pre-treatment values, was near zero; and the 95% CIs overlap zero, indicating that harvesting had no statistically significant effect on soil C or N across the entire data set. Significant differences were found, however, in the effect on soil C and N among harvest methods, with sawlog harvesting causing significant increases in soil C and N and whole-tree harvesting causing slight decreases. The increases in soil C with sawlog harvesting was entirely associated with coniferous species, that is, there was a significant species effect within the sawlog harvest category, with conifers producing more soil C after harvest than hardwoods or mixed stands. The coniferous species also produced significant increases in soil N after sawlog harvesting whereas hardwoods produced on significant effect, and mixed species produced a negative effect. There were no significant effects of harvest type, time since harvest, or species on the soil B horizons or on whole-soils, although the overall patterns were similar to those in the A horizons (Johnson & Curtis, 2001)."

The Department recognizes increasing trends of dead biomass in older forest carbon pools and the reduction in the production of snags under intensive management. However, the Department also recognizes that decomposition of these dead trees and woody material is also an emission from these older stands that can lower the net sequestration rate for the stand. When leakage to account for replacement of wood products foregone from these stands as well as wildfire is factored into to a life cycle analysis, it is likely that these unmanaged stands may show a net emission at some point in the future. From a policy perspective this may be an appropriate decision based on other resource or societal considerations, but it should not be assumed that from a GHG perspective that a decision to forego management of a forest stand is the best choice from a global warming and greenhouse gas reduction perspective.

It is also likely that some carbon will be lost from the soil carbon pool as a result of this operation through the harvesting and subsequent site preparation activities. As we discussed previously, site preparation activities will facilitate faster site occupancy and crown closure of the developing stand post harvest. The pattern of soil carbon dynamics based on the literature review in the Heath and Smith (Gen. Tech. Rep. RMRS-GTR-59. 2000) paper indicates a consistent pattern of initial increases in soil carbon following harvest, followed by a period of a loss of 11 to 20 percent of the soil carbon, followed by a period of recovery. It is unclear from their review what site preparation methods were used but one study in loblolly pine utilizing pre-harvest low intensity burns showed recovery to above pre-harvest levels of soil carbon within 13 years.

Heath and Smith summarize soil carbon accounting and assumptions for forestry and forest related land use change. Their conclusions based on a review of existing literature on harvesting impacts on soil carbon pools were summarized as follows: "Based on this preliminary review, soil carbon dynamics following harvest appear to depend on the amount of disturbance caused by logging operations. The disturbance associated with some

commercial harvests may cause soil carbon to increase initially in the first few years by 8-13 percent, and then decline to below initial values by 11-20 percent by 10-20 years after harvest, and eventually increase again. Some studies showed changes in soil carbon below the 0-30 cm depth, indicating that experimental soil studies should sample lower soil depths. Severely eroded soils also create additional problems concerning depth because much of the original soil may be eroded. (Gen. Tech. Rep. RMRS-GTR-59. 2000)."

Other researchers have also concluded that managed forests have been shown to sequester more carbon and have fewer emissions than unmanaged forests (Birdsey et. al. 2000, Krankina and Harmon 2006; Hoover and Stout 2007). It is clear that while carbon storage and sequestration rates in unmanaged stands is high, active management of forest stands to produce wood products can also be a viable option for improving or maintaining sequestration. Contributions of wood products should not be ignored nor should the substitution benefits of wood products compared to other building materials. That said, it is also recognized that forests which will be managed to maintain or create old growth, even though growth on mature trees will slow, ecosystem storage of carbon may increase as a result of increases in other carbon pools (Zhou et al. 2006; Schulze et al. 2000).

Comparisons of long rotation or no harvest scenarios to shorter rotations need to be done in light of leakage, wood products substitution benefits, low carbon fuel benefits associated with woody biomass, etc. All of these factors would need to be analyzed through a life cycle analysis comparison of the various management scenarios. These types of life cycle analyses have not been completed although it can reasonably infer that a relatively broad range of management scenarios can support high levels of sequestration. The Department's analyses of rotation length (Robards, 2008) while not exhaustive did indicate that an 50 to 80-year rotation length will capture a high proportion of the sequestration production capacity of a given site depending on site productivity. Decisions to require longer rotations need to balance the GHG implications with other resource values. For California privately owned timberlands production of wood products is recognized as one of the uses that will occur on these landscapes.

Other studies quoted in Issue #23 also refer to the fact that there may be different results when experimenting with in C storage in old-growth logging as compared to the non-old-growth condition of the current THP or the type of forests referred to in the SPI Option "a". For example, the study titled "How Strongly Can Forest Management Influence Soil Carbon Sequestration", R. Jandl, et al. states: "Even though single old-growth forests can have impressive rates of C sequestration (Schultze et al., 2000;Knohl et al., 2003), we are skeptical with respect to the role of the elongation of the rotation period of forests. Forests beyond a certain age are susceptible to disturbances. The aboveground productivity declines with age (Ryan et al., 2004). (from R. Jandl, et al., 2007)." Also, "We conclude that ageing of forests results in increasing C densities in management systems with longer rotation lengths, provided the harvest age is not beyond the age where the forest stand turns from a net sink to a source of C. The magnitude of the effect of increased rotation

lengths depends on the current management practice." (R. Jandl, et al., 2007) And "Forests between 40 and 100 years old are a strong net C sink (about 1 t C/ha/yr), older forests are a weak sink (about 0.2 t C/ha/yr) (Wirth et al., 2002) (from R. Jandl, et al., 2007)".

Continuing with respect to studies linked to old-growth conditions, the study "Effects of Carbon Storage of Conversion of Old-Growth Forests to Young Forests" was quoted in issue #23 as being the source of a net increase of over 1.5 billion tons of C into the atmosphere. As stated in this report, "In this report, we explore the effects that conversion of old-growth to younger forests has on atmospheric CO_2 and terrestrial C budgets. (Harmon et al., 1990)" Again, there is no provision in the current THP or in the SPI Option "a" for the Southern Forest District that proposes conversion of old-growth forests, as these lands have been harvested numerous times over the past century or so and are not growing at their full potential. The current THP proposes a much longer rotation period than was present in the past on these lands where it was common to have at least one THP entry per decade, if not more. With respect to comparisons between older and younger age forests, the study "Carbon Cycling and Storage in World Forests: Biome Patterns Related to Forest Age" states "Aggregated biome-level estimates of net primary productivity (NPP) and net ecosystem productivity (NEP) were higher in intermediate-aged forests (e.g., 20-120 years), while older forests (e.g., >120 years) were generally less productive (Pregitzer et. al, (2004)." Also, "The mean value was high in the youngest temperate age class (9.7 Mg C/ha/yr) and declined with age, implying that forest ecosystem respiration peaks when forests are young, not old (Pregitzer et. al, (2004)."

While comments in Issue #23 cite a study by Luyssaert et al. (2008) which finds that old-growth forests can continue to store carbon, there are numerous other studies which have come to different conclusions. The study, "Carbon Dioxide Exchange Between an Old-growth Forest and the Atmosphere, (Paw U et al., 2004), which is a study that also concludes that old-growth forests continue to store carbon, cites the numerous other studies that have expressed a "carbon neutral" theory for old-growth forests as follows: "A number of articles published in the past 15 years have suggested that old-growth conifer forests are at equilibrium with respect to net ecosystem productivity or net ecosystem exchange (DeBell and Franklin 1987; Franklin and DeBell 1988; Schulze and others 1999), as an age-class end point of ecosystem development. Related to this concept is the view that young forests represent some of the most significant sinks of CO2 because of their rapid growth (Houghton and others 1983; Birdsey and others 1991; Heath and Birdsey 1993; Wofsy and others 1993; Turner and others 1995; Schimel and others 1996; DeLucia and others 1999). Janish and Harmon (2002) examined carbon stores in the Wind River watershed and found maximum carbon accumulation in forests of the 200-year age class. Respiration in young stands released more carbon because of legacies from prior forests. Goodale and colleagues (2002), using inventory data of temperate and boreal forests and models, concluded that over 80% of the estimated terrestrial sink occurred in just one-third of the forest area, in temperate regions affected by fire suppression, agricultural abandonment, and plantation forestry, implying that regrowth was a significant factor in forest carbon sequestration (Paw U et al., 2004)." Certainly, in the compendium of literature cited in this example, one can find studies that either support or reject the "carbon neutral" theory of old-growth which, as previously mentioned, isn't even the condition that is found on the current THP. CAL FIRE also notes the following quote from Luyssaert et al. (2008) which suggests

that even young forests can be a CO_2 sink; "On the basis of our global data set we find that in forests between 15 and 800 years old, the NEP is usually positive; that is, the forests are CO_2 sinks (Luyssaert et al.,2008)." While the area of this particular THP and cumulatively of the area described in the Option A plan will soon have numerous acres of plantations at and exceeding 15 years of age, it is not even possible to imagine 800 year old forests given that most of the pine and fir species grown on these lands do not typically reach these extreme age classes. The possible exception might be Douglas-fir where it occurs on these lands in a portion of the Southern Forest District, but even in these stands given frequent dry summers and fire conditions, it would be very unusual for stands to achieve extreme age classes. One more commonly associates very old Douglas-fir forests with the near "rainforest" conditions in the Pacific Northwest or as a component of the very wet and foggy coast redwood forests of northwestern California.

With respect to a study cited in Issue #23 above that stated old-growth forests store more than four times the carbon as young-growth forests, the statement really reveals the problem of using results from studies where there is a conversion from old-growth to young-growth rather than using examples that are closer to reality given the condition of the stand that is being harvested pursuant to this THP and to the Option "a". This report titled "Changes in Carbon Storage and Fluxes in Chronosequence of Ponderosa Pine" was done in Oregon and it is not known if there would be crossover results applicable to the California situation. The study did, however, observe that: "The modeled and observed patterns of net carbon exchange are similar, in that both show an early source, followed by a strong sink that declines with age, approaching neutral carbon status for the oldest stands. The modeled and observed peak sink strengths are similar, but the model predicts a more rapid shift from source to sink during the early stages of stand development following disturbance, with the modeled peak sink strength occurring around stand age 25 year, compared to the observed peak around 70-100 year (Law et al., 2003)." While the conclusion is that a better model is needed, it is worthy to note the statement that the carbon sink was observed to be somewhere in the age of rotation that is predicted for the SPI stands in the Option "a", although again, this study was for an Oregon timber stand without knowing if it would be fully applicable to the California condition.

Issue #23 above makes the comment from Janish & Harmon (2002) that; "This research indicates that it takes more than 150 years for a cut-over forest to produce the amount of living and dead biomass that exists in an old-growth forest." However, what this quote really says is that it takes a long time to re-grow a cut-over forest to the point where it could be considered an old-growth forest. The quote ignores the contribution of stored soil C and ignores the carbon sequestration that is contained in the forest products that were made from the harvested trees. The quote also ignores the fact that the current THP is not an old growth forest that is being harvested. Also, figures and charts from the publication show that increased levels of carbon sequestration take place before the point where the area achieves "old-growth" status in terms of living and dead biomass. (see Janish & Harmon, 2002, pg. 83, Fig. 4).

Another statement from Issue #23 above is from Smith and Heath (2002) and states: "Another study based on a model quantifying carbon in various types of U.S. forests found that clear-cutting causes significant carbon releases from the forest floor because the

practice reduces litter input while increasing decomposition." Actually, the quote from the study says that "Reductions in forest floor carbon are possible following a clearcut harvest" and "If forest floor mass is lost quickly after harvest, then patterns of carbon storage will follow closely those of afforestation (Smith and Heath (2002)." In other words, under these circumstances, which pattern closely the type of harvest being done by SPI in this THP and in the larger Option "a", there would be a quicker turn-around of the area going from a carbon source to a carbon sink where the growing replanted forest would be taking up atmospheric CO_2. The same publication also says: "Covington (1991) described the dynamics of forest floor mass for northern hardwood forests following clearcut harvesting. Forest floor organic matter decreased the first 15 years following clearcutting of northern hardwood forests in New Hampshire. A 50% decrease was followed by a slow recovery of forest floor for about 50 years before floor mass was within 5% of preharvest levels (Smith and Heath (2002)." It should be noted that "forest floor" carbon only includes the plant material including "leaves, twigs, bark, and woody stems (Smith and Heath (2002)." It does not, therefore, include the total forest carbon where 50% has been previously said to be in the soil and another large amount is in the tree itself.

Another statement from Issue #23 above is attributed to studies from Schulze (2000), Harmon (1990) and Kurz et al. (1998) as follows: "These studies indicate that carbon uptake by young trees in plantations and re-growth forests does not compensate for the amount of carbon presently stored in natural forests that would be lost if they were harvested. Thus, transforming old-growth forests into plantations results in losses of up to 50% of total ecosystem carbon." The study from Harmon (1990) has already been discussed in this Official Response and is concerned with the fate of carbon when converting from old-growth forests to young forests and is in fact titled: "Effects of Carbon Storage of Conversion of Old-Growth Forests to Young Forests." This, of course, is not being proposed in this THP or in the Option "a". The change, in this case, is going from a second or third or fourth plus growth forest that is not growing near capacity to a genetically improved, fully stocked stand. Likewise, the study from Schulze (2000) talks about the proposals to convert from so-called "stagnant" old-growth forests to plantations and makes the argument that we are better off keeping the old-growth forests as they sequester large amounts of carbon just from the standpoint of biomass. Again, the THP does not propose the conversion of old-growth forests to plantation forestry, as stated above. Finally, the study from Kurz et al. (1998) pertained to the carbon budget implications of making the change from a so-called "natural" or "un-managed" condition to a "managed" condition. Once again, the current THP proposed going from a "managed" to a "managed" condition, or rather continues the current managed condition. However, the Kurz et al. study does contain some interesting information. For example, "Land-use change from an unmanaged to a managed forested landscape in northern forests is associated with a reduction of the area annually affected by natural disturbances (wildfires and forest insects) and the introduction of harvesting as a new disturbance (Kurz et al., 1998)." In other words, where there is a lack of forest management, there could be an increase in the disturbances caused by wildfires and insects. This has previously been discussed in this Official Response with the example of the large insect problem that occurred in the Southern California mountains. Another example noted by CAL FIRE would be the damaging Angora fire in the Lake Tahoe Basin which was so heavily regulated that it became impossible to economically and effectively thin the forest to reduce the potential for the spread of wildfire. The Kurz study studied six

different landscape situations where the regime changed from unmanaged to managed and found: "In four of the six example landscapes, ecosystem and total C content changed by less than 13% (Kurz et al., 1998)." Also, "the annual changes in the three main C pools and in the total system were always largest in the first decades after the transition to the managed system commenced. In five cases, there was an initial annual reduction in total C content. The annual reduction decreased in magnitude with time. In three of the six landscapes, total C content increased during the latter part of the simulation and approached the values observed in the natural disturbance regimes (Kurz et al., 1998)." These examples show that recovery to the natural condition can occur after the change from unmanaged to managed (harvesting), however, it is not known how applicable the information is since the current THP, as stated, is under a different management scenario.

The following quote is contained in Issue #23 above from Luyssaert et al.,(2008): "As one study concludes: In fact, young forests rather than old-growth forests are very often conspicuous sources of CO^2 because the creation of new forests (whether naturally or by humans) frequently follows disturbance to soil and the previous vegetation, resulting in a decomposition rate of coarse woody debris, litter and soil organic matter (measured as heterotrophic respiration) that exceeds the NPP (net primary production) of the regrowth." This study has previously been discussed in this Official Response, however, it is interesting to note another quote from the study as follows: "A stand must be spared for centuries from stand-replacing disturbances (such as fires, insect outbreaks, wind-throw and avalanches) in order to accumulate sufficient aboveground biomass to become old growth. Because the cumulative probability of disturbances is higher in stands with high above-ground biomass, old stands are rarer than young stands, even in unmanaged landscapes. At the landscape level, we expect a mosaic of forests characterized by different times since the last stand-replacing disturbance (Luyssaert et al., 2008)." CAL FIRE has previously made this finding with respect to fire and insect prone stands. Additionally, there are political realities which would apply to the notion that we are better off with old-growth for carbon storage on these private industrial timberlands. The legislation itself in the Z'berg-Nejedly Forest Practice Act of 1973 in PRC Sec. 4512 speaks to the value of forestlands to furnish "high-quality timber" as being one of the goals. Additional guidance is found in the zoning of these lands as "Timber Production Zones (TPZ)". On these lands, the annual property tax to counties was converted to a one-time yield tax on harvested timber. The advantage to the public is that these forested lands can be kept from conversion to other uses by deferring taxes until such time that there is revenue available from the harvest of trees. Of course, it follows that there is an expectation that the trees will be harvested at some point in order for the deferred to tax to be eventually paid to the counties. This kind of zoning is not likely to produce "old-growth" forests in addition to the above noted natural stand-replacing events that are likely to occur as stated in the quote from Luyssaert et al., 2008.

The statement in Issue #23 that is attributed to Harmon et al. (1996) as follows: "These studies show that after logging, only a small fraction of the total carbon stored in a forest ecosystem is turned into forest products like paper and lumber, and many of these products decay quite quickly." This study captures the fate of forest products manufactured from 1900-1992. Again, however, similar to findings quoted above in the Official Response for Skog & Nicholson (2000), this period of time covers vast changes in uses of forest products, technology and landfill construction. A quote from Harmon et al. (1996) follows: "Since

1950, the overall manufacturing efficiency has increased steadily (approximately 61% in 1992) because of changes in individual manufacturing efficiencies and use of wood waste for paper production, and an increase has partially offset the generally lower harvests during 1975 to 1992 (Harmon et al., 1996)." Also noted are improvements in use of sanitary landfill for waste storage; "The overall rate of increase of forest-product carbon stores from 1900 to 1992 was 4.3 Tg year. Form 1972 to 1992, the rate was 6.02 Tg year, indicating that, if anything, the rate of forest-product accumulation is increasing, largely because of the growth of the landfill pool, which had average net accumulations of 0.33 Tg year between 1953 and 1972 and 3.45 Tg year between 1972 and 1992. In contrast, the net accumulation rate in long-term structures has increased only slightly over those two periods, from 3.2 Tg year to 3.65 Tg year (Harmon et al., 1996)." Also quoted in the study was the increase of recycling for paper products that has occurred in recent times, much of which is mandated by public policy and regulation. The take-away message is that there are significant changes in carbon storage for forest products such that general statements made for a period of 1900 to 1992 cannot be reliable comparable to the current situation.

Finally, with respect to the quote in Issue #23 attributed to Bergeron et al. (2007), CAL FIRE cannot determine where in the report there is any finding that there is evidence that "cut-over lands emit significant amounts of carbon compared to uncut forests." The study was done in mature black spruce forests and studied carbon fluxes during different seasons in these forests. There was no indication that there was any attempt to compare logged and un-logged black spruce forests with the three sites that were picked for the study. Possibly this study was referenced incorrectly, but at any rate, the Department is unable to find that this study is relevant or that it contains any applicable evidence. Certainly boreal black spruce in a waterlogged, near permafrost situation where mosses are a predominant feature of the forest floor is difficult to compare to a temperate pine and fir forest in a Mediterranean climate.

CAL FIRE has reviewed the studies referenced herein and finds no conclusive evidence from these reports that the project would likely create a significant adverse environmental impact with respect to release of carbon and further has reviewed the requirements of AB32 and found that they can be complied with as discussed in the Response to Issue #21 above.

24. Concern: It was stated THP 4-08-05 Is Legally Inadequate Because It Fails to Identify, Evaluate and Mitigate the Plan's Cumulative Contribution to Global Warming in that CDF must require revisions in THP 4-08-05 to address the cumulative impacts of the plan on global warming. As noted, the Governor's Office of Planning and Research has urged lead agencies to start reviewing the GHG emissions of projects now, without waiting for the related CEQA Guidelines to come out by January 2010. This entails (i) identifying and quantifying the project's GHG emissions, (ii) assessing the significance of the emissions' cumulative impacts on climate change, and (iii) identifying feasible alternatives and/or mitigation measures that will reduce the impacts below significance. As a result, CDF should require SPI

to revise THP 4-08-05 to provide quantitative information on the plan's short and long-term OHO emissions, including CO^2 releases from the forest resources removed and disturbed, as well as CO^2 emissions from the harvesting activities (e.g. diesel emissions from logging equipment). Based on this information, CDF must assess the significance of the emissions and, if they are significant, identify mitigation measures and alternatives to reduce those emissions. Methods already exist for measuring carbon emissions related to logging. To comply with the guidance from OPR, CDF and SPI must use such methods to revise THP 4-08-05 to provide this information, and adopt any related mitigation measures required by CEQA and the Forest Practice Act.

Response: The data and information included in the Option "a" are part of the plan and indicate that the management regime for the SPI ownership as a whole will lead to improvement in growing stock levels (stored carbon) and improvement in stand growth (sequestration). These two factors combined with storage in wood products and substitution benefits of wood products compared to other building materials will have long term climate benefits (see other responses). Regarding the cumulative impacts of harvest of trees, where some of the wood waste is used in cogeneration of electricity, one must consider how use of renewable wood chips or waste offsets other non-renewable fossil fuels that require an even larger release of CO_2. From Nabuurs and Sikkema (2001), "Thus, wood products have three roles in the carbon cycle: (1) as a physical pool of carbon; (2) as a substitute for more energy-intensive materials that require larger fossil fuel emissions for production; and (3) as a raw material to generate energy, saving CO_2 emissions from fossil fuels." Also from the same report, "The Energy chapter (of the Kyoto Protocol) states that a country should measure its CO_2 emissions from energy production (electricity, warmth) by calculating the annual use of fossil fuels only. Biomass fuels (wood, straw, etc.) are not taken into account and are therefore considered CO_2-neutral because growth minus harvest was already accounted in the LUCF model."

The Department has worked with the Air Resources Control Board (ARB) to assist with development of the 1990 baseline for the Forest Sector and assisted ARB with workshops and liaison with the Board of Forestry and Fire Protection as part of the AB32 Scoping Plan development. The Scoping Plan was adopted in December of 2008 and establishes a 2020 target for the Forest Sector of 5 million metric tons of carbon sequestration. Achievement of this target will require that the Sector maintain present estimated levels of net sequestration. Essentially this represents a no net loss strategy for the Forest Sector as a whole. Management regimes which maintain or increase inventory and growth will contribute to this objective. As we have discussed in previous responses, the Department has concluded that the estimates of inventory increase and growth for SPI's timberland are reasonable and that net sequestration over time will increase in support of the AB 32 target. Adoption of a zero significance threshold in this case is not necessary given that the management regime will result in a net or neutral benefit from a climate standpoint (see other responses).

In support of this finding, CAL FIRE recognizes under SPI's management regime that carbon stocks and sequestration rates will improve over time (See previous response). The

measures included in the site preparation and regeneration plan will partially mitigate the carbon loss that will occur during reforestation of the replanted sites. The impacts of the site preparation activities and reforestation on carbon pools will also be addressed by prompt reforestation and selection of an 80 year rotation age and improved growth rates associated with managed stands. Regarding the impacts of diesel engine emissions involved in yarding and hauling activities, the THP addresses these activities on pages 115 et seq., a table is presented to calculate emissions and a statement is included as follows: "In conclusion, this worst case scenario for net GHG emissions at the scale of each thousand board feet (MBF) harvested, shows that logging sequesters 8.77 tons of CO_2 in permanent off-site stored solid wood products for each ton of CO_2 emitted. In some areas waste from harvesting (called biomass), consisting of sub-merchantable trees, tree tops and branches and the like is removed from the forest and used as fuel in biomass cogeneration plants producing steam and electricity. Using this biomass to generate electricity and steam nets 16.25 tons of CO_2 benefits for each ton of CO_2 emitted in the collection process. However, the decision to not remove biomass from a particular harvest site does not cause net emissions of GHGs because our Option "a" demonstrates that net of all biomass removals we still increase total carbon stored in the forest (in growing trees) each year. Since we analyzed the worst case in fuel emission, all other harvesting systems have lower emissions per mbf or green ton of biomass and will have even greater benefits than calculated. Thus after conduction this GHG assessment at 3 scales on analysis (SPI's entire ownership, society's use of wood products, and at the project scale) we conclude that we are not causing any significant adverse impact on the condition of GHG and that we actually produce a net carbon benefit of considerable magnitude by removing CO_2 from the atmosphere and storing the carbon in our forests and wood products." CAL FIRE finds these calculations and conclusions to be reasonably presented and additionally finds that no additional mitigation would be required for diesel engines as emission standards for the diesel engines typically associated with log hauling, loading and yarding activities have recently been recently addressed through actions taken by the Air Resources Control Board. In addition, even-aged management and clearcutting in particular will minimize the fossil fuel energy needed to produce an equivalent volume of harvest and from an energy consumption perspective represents the best option for energy use efficiency through a more compacted, less spread-out logging area which is needed to obtain an economically viable timber volume. Based on this Air Board action and harvesting based energy efficiencies attributable to the silvicultural method, the Department has concluded that no additional mitigation is needed. (see Responses to Issues #14 through #24 in this Official Response).

25. **Concern:** {The following letter of concern was submitted from Foothill Conservancy and is very similar to a letter of concern submitted by a member of the Calaveras County Board of Supervisors. As such the two comment letters are combined in Concern #25 for Response.} Since 1997, 1,792 acres of a total Lower Blue Creek watershed area of 8,320 acres have been either clearcut or nearly clearcut. 22% of the watershed and 39% of SPI's ownership has been clearcut or near clearcut (1,792 of SPI's 4,617acres). This Squiggly THP adds 369 acres of clearcutting to this already severely impacted watershed. This would bring the total clearcutting to 2,161 acres (over 3 square miles). The rate of cut by SPI is another issue that

needs addressing by CAL FIRE. SPI's harvest by clearcut and near clearcut methods of 40% of their ownership in this planning watershed within less than 12 years would imply they are pursuing a rotation age in this region of closer to 30-40 years than the 60-80 years they state on page 76 of this THP. Because of the multiple impacts of this accelerated rate of harvest in a specific part of their ownership, we request CAL FIRE to conduct an analysis of rate of harvest in the Calaveras County and to make that analysis public. CEQA requires establishment of a threshold of significance in order to assess potential or actual significant impacts. Yet, there is no threshold of significance set forth by CAL FIRE in the THP as to when any potential significant impacts to biological, water, aesthetic, and economic considerations required by the FPA that might occur from the intensive harvest over a quarter of the watershed within such a short period of time. The Squiggly THP shows SPI's foreseeable projects in the Mokelumne would add 10,794 acres of additional harvest into the watershed. SPI's statements in this THP and elsewhere indicate a majority of this would be by clearcut or near clearcut methods. Currently, THP submissions from SPI are 80-90% clearcut or near clearcuts. CAL FIRE has not set any "threshold of significance" for when this harvest might pose a potential significant impact, despite CEQA's requirement that they do so. The Squiggly THP makes inaccurate assumptions regarding habitat and plantations. Please note: FC incorporates by reference into this letter all comments and appended material in the Ebbetts Pass Forest Watch and CSERC's Brief (Brief) on Cow Camp (submitted by Michael W. Graf – Case No. C V54240 submitted to the Superior Court, Tuolumne County, on 3/11/09. The Brief states on page 1 that "In approving Cow Camp THP and other SPI THP's in the District, CDF accepts these assertions that plantations will improve wildlife habitat and even relies on them in making its findings that the THP will have no significant impacts on the environment... The problem in this case is that none of these assertions are warranted." The same assertions are made in the Squiggly THP and again, as documented in the Cow Camp Brief, they are not warranted. As stated in the Brief, the record shows that SPI's even-aged management has the potential for significant impacts on wildlife because it eliminates late seral forest and early seral vegetation.

Response: The Department especially thanks the member of the Calaveras County Board of Supervisors for his concern with respect to the analysis of the cumulative and direct impacts of this THP. Every effort was taken by CAL FIRE as directed by the rules of the BOF and other appropriate regulations to address these concerns in this Official Response and during the review of the THP itself. In accordance with the rules of the BOF, the Calaveras County Planning Department was notified of this plan and was sent a copy upon submission of the plan for their review and comment. There were no comments received from the Calaveras County Planning Department that were adverse to the project during the period of review for the plan. Likewise, 14 CCR Sec. 1037.5 establishes the composition of the Interagency Review Team that participates in the on-the-ground Pre-harvest Inspection and/or the office review of the project. The language of this regulation states that the team consists of: "...a representative of county government when the county government so requests." CAL FIRE notes that there was participation in the review of the plan a representative of the county government and appreciates that participation. The rules of

the state legislature in PRC 4516.5 give the various counties the ability to propose county specific regulations when the county finds that the general rules of the BOF do not adequately address county specific concerns. However, CAL FIRE notes that the county of Calaveras has not requested county specific regulations from the BOF and therefore, the general rules of the BOF apply when CAL FIRE reviews projects in the county.

With this background in mind, the Department has examined the condition of the Blue Creek Planning Watershed and other components of the Mokelumne drainage for potential significant adverse environmental. This Official Response addresses many of these matters, especially with respect to watershed impacts in the Response to Concern #4 above and, for the sake of brevity, these examinations of the Mokelumne watershed will not be repeated here in the Response to Concern #25, but rather are included by reference. However, it will be noted by CAL FIRE that there was no finding that the planning watershed or the forested portion of the Mokelumne drainage as a whole was a "severely impacted watershed" as alleged in the Concern #25 above. The Department has discussed matters relating to wildlife and plant cumulative impacts from the combined past, present and reasonably foreseeable future projects especially in the Response to Concerns #2, #3, #5, #6, #7, #8 and #9 and, for the sake of brevity, these examinations will not be repeated here in the Response to Concern #25, but rather are included by reference. Likewise, the THP itself addresses the potential for cumulative adverse environmental impacts to watershed, biological and other forest values in accordance to the methods required by the BOF in the rules and especially in Technical Rule Addendum #2. These extensive examinations can be found in the THP in pages 61 to 114 et. seq. and, for the sake of brevity, will not be repeated here in the Response to Concern #25, but rather are included by reference. However, it will be noted by CAL FIRE that there was no finding in the THP that the planning watershed or the forested portion of the Mokelumne drainage as a whole was a "severely impacted watershed" as alleged in the Concern #25 above. Past, present, and reasonably foreseeable future projects as defined in 14 CCR Sec. 895.1 are revealed in these THP pages and the past projects on the submitters lands are mapped by THP year and silvicultural method which can be combined by the reader to show the concentration and spread of the various treatments within the planning watershed.

As discussed in the THP and in this Official Response, about 43% of the planning watershed is owned by the federal government and is subject to a different type of management where production of high quality timber products is not currently a goal. The lands owned by the plan submitter are being reforested at a rapid rate and the trees that are being planted are genetically equipped to grow back to make the expected impacts of forest openings of the size prescribed by the BOF a relatively short-term proposition. Treatments are being done to reduce the impacts of competition to conifer seedlings for limited water, soil and nutrient resources to insure tree survival and encourage rapid growth. Forest openings themselves are subject to BOF size limits, spacing between even-age treatments and a time period that regulates adjacency. Regarding the actual amount of harvest in the Planning Watershed over the past ten years, the table in the plan contains acres of logging for THP 4-00-85. However, this plan was withdrawn and was never approved. Also, most of THP 4-98-118 is actually located outside the Planning Watershed and all but 37 acres of this plan need to be subtracted from the totals as well. The result is that the amount of logging in the Lower Blue Creek Watershed before the submission of THP 4-08-005 is 15%

of the watershed for uneven-aged silviculture (1203 acres) and 14% for even-aged silviculture (1127 acres). With the approval of THP 4-08-005, the total is still 15% for uneven-aged (1257 acres) and 18% for even-aged (1511 acres). Therefore, the total for all types of logging in the past ten years including THP 4-08-005 would be 2768 acres, or 33% of the planning watershed.

The plan submitter, as discussed especially in the Response to Concern #14 in this Official Response, is subject to an Option "a" plan which discusses the anticipated rate of harvest on their property in the Southern Forest District as a whole. This industrial timberland owner is subject to proving adherence to the principals of long-term sustained yield and maximum sustained productivity of high quality timber products and has done so in the Option "a" plan. The document shows the expected forest rotation age, which is not the "30-40 years" as alleged in the Concern #25. It should be noted that the Option "a" is not required to be administered on a planning watershed by planning watershed basis, but is instead required to be followed within the entire plan submitter landholding on their property within the Southern Forest District as a whole. An individual planning watershed may appear to vary from the Option "a" goals and demonstrations of long-term sustained yield and the overall expected rotation age and this is not a violation of the rules of the BOF in and of itself.

As to the allegation that there is no "threshold", the Department notes the definition in the rules of the BOF in 14 CCR Sec. 895.1 for a significant adverse impact on the environment which means: "...a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project..." as the threshold as defined by the BOF.

The Department refrains from commenting on the legal brief submitted to the Superior Court of Tuolumne County in the recent lawsuit against the Department and SPI as this matter is actively undergoing argument and findings at the present time. However, with respect to the comment in the Concern #25 about the assertion in THP 4-08-005 with respect to the wildlife qualities of the plantations that result from the even-age management, CAL FIRE notes the discussions in this Official Response in the Response to Concern #10 above. This response notes the findings of DiTomaso, Joseph M., et al. 1997 in the report: "Post-fire herbicide sprays enhance native plant diversity". ((California Agriculture 51(1):6-11)) This report shows the finding that plant diversity returns quickly in a post fire environment of forest openings even where herbicide has been applied, as should be similar to the treated openings created during the plantation forestry of this project. The THP itself, on pages 53 – 60, discusses the logic that goes into choosing the silvicultural methods, which includes consideration of the long term benefits to wildlife species and forest diversity. CAL FIRE notes also that the rules of the BOF, especially in Technical Rule Addendum #2, requires an assessment area evaluation of a THP project and that this would include the entirety of the area affected by this particular project in combination with past and reasonably foreseeable future projects. In addition to the even-age treatments, the entire area includes about 43% of the watershed assessment area which is owned by the federal government having a different management goal. The area also includes selection treatments, WLPZ protection areas, and a variety of logged and unlogged areas that create a mosaic of diverse areas over the landscape as a whole, even while recognizing that there

are going to be blocks of areas where trees are going to be of a similar age and presumably are going to be similar in height. Taken as a whole, however, even these blocks of planted trees will have a variety of age and heights that are different when comparing one to another given that they are being created over a long rotation age.

26. Concern: It was stated that there was a failure to meet the legal standards of review and analysis and that EPFW has been active in monitoring and commenting on THPs in the Sierra Nevada for the past nine years. During that time, the Director of the California Department of Forestry and Fire Protection (CAL FIRE) has consistently approved THPs submitted by SPI without requiring significant alterations based on the extensive, substantiated comments filed. During the course of that time period, the number of evenaged management acres harvested and filed to be harvested has continued to grow without adequate analysis by CAL FIRE as to the potential or current significant impacts from such approval. EPFW believes that the Squiggly THP, like all the others upon which EPFW has commented, fails to meet the clear legal standards of review and analysis required in a CEQA-equivalent document. This is a fundamental reason for which this plan must be denied. CAL FIRE has been given a serious role to serve as lead agency on THPs, documents that have been granted functional equivalency status for the CEQA process. CAL FIRE has been given clear direction on their mandate in that regard through the Z'Berg-Nejedly Forest Practice Act of 1973 (FPA)

(c) The Legislature thus declares that it is the policy of this state to encourage prudent and responsible forest resource management calculated to serve the public's need for timber and other forest products, while giving consideration to the public's need for watershed protection, fisheries and wildlife, and recreational opportunities alike in this and future generations....
4513. Intent of Legislature. It is the intent of the Legislature to create and maintain an effective and comprehensive system of regulation and use of all timberlands so as to assure that:
(a) Where feasible, the productivity of timberlands is restored, enhanced, and maintained.
(b) The goal of maximum sustained production of high-quality timber products is achieved while giving consideration to values relating to recreation, watershed, wildlife, range and forage, fisheries, regional economic vitality, employment, and aesthetic enjoyment.[1]

This direction is clarified in the Forest Practice Rules (FPR) promulgated for the FPA's implementation: 897b) In determining whether a THP conforms to the intent of the Act, the Director shall be guided by the following principles:

(1) The goal of forest management on a specific ownership shall be the production or maintenance of forests which are healthy and naturally diverse, with a mixture of trees and under-story plants, in which trees are grown primarily for the production of high quality timber products and which meet the following objectives:
(A) Achieve a balance between growth and harvest over time consistent with the

harvesting methods within the rules of the Board.

(B) Maintain functional wildlife habitat in sufficient condition for continued use by the existing wildlife community within the planning watershed.

(C) Retain or recruit late and diverse seral stage habitat components for wildlife concentrated in the watercourse and lake zones and as appropriate to provide for functional connectivity between habitats.

(D) Maintain growing stock, genetic diversity, and soil productivity.

(2) Individual THPs shall be considered in the context of the larger forest and planning watershed in which they are located, so that biological diversity and watershed integrity are maintained within large
planning units and adverse cumulative impacts, including impacts on the quality and beneficial uses of water are reduced.

Recently, an Attorney-Client letter (Board Advice) from the Attorney General's Office reiterated and discussed the obligation of CAL FIRE and the Board of Forestry in analyzing and approving THPs. There is no question that much of the FPA discusses timberlands and their productivity but again, while timber harvesting is clearly an important focus of the FPA it is not the exclusive focus: the FPA directly addresses the entire forest system, including forest resources. In addition to the language of the FPA itself, the Board also has the responsibility under the California Environmental Quality Act (CEQA). The Secretary of Resources has certified the regulation of timber operations, including the timber harvest plan review process under the FPA and the Forest Practice Rules by the Department and the Board as the functional equivalent of an environmental impact report (EIR) under CEQA (Cal. Codes Regs., tit. 14 § 15251(a).) As such, the Department must meet the requirements of CEQA while approving THPs and other plans to harvest timber. (Sierra Club v. State Board of Forestry (1994) 7 Cal 4th 1215, 1230.) In addition, the Board's regulatory program has been certified as a functional equivalent of an EIR under CEQA. (Cal. Code Regs., tit. 14 15251(e).) "It is the dual nature of the FPA, to protect the environment and to secure maximum sustained production of high-quality wood products that permits the regulatory program under the FPA to function as functionally equivalent program under CEQA...." CEQA requires a regulatory program to meet specific requirements in order to be certified as the functional equivalent of CEQA's EIR process. First, the enabling legislation for the program (in this case, the FPA) must include the "protection of the environment among its principle purposes," and contain "authority for the administering agency [in this case, the Board] to adopt rules and regulations for the protection of the environment." (Pub. Resources Code, § 21080.5, subd. (d)(1).) These rules and regulations must provide, among other things, that an activity cannot be approved if feasible alternatives or mitigation measures exist that would substantially lessen any adverse impacts of the activity on the environment. (Pub. Resources Code, § 21080.5, subd. (d)(2)(A).) (p.6) As stated above, the explicit language of the FPA requires that the Board balance timber production and protection and restoration of forest resources. However, the FPA does not require that this balance be affirmatively struck in favor of timber production or otherwise constrain the weight the Board may give to protection and restoration of other natural resource values provided by timberlands in the rules and regulations promulgated by the Board. Nor do CEQA, CESA or any other statute otherwise constrain the Board's discretion in this regard. Indeed, if anything, both

CEQA and CESA assure that forest resources, including imperiled species and their habitat, be protected during timber operations and thus balance the Board's authority to weigh too heavily in favor of timber production. (p. 8) As clearly stated in the Board Advice, CAL FIRE must require that an approved THP meet the standards of CEQA. EPFW feels that many of those standards are absent or inadequately fulfilled in Squiggly, as in other THPs EPFW has examined. It would take volumes to detail all the specific places in the THP where these standards are ignored or inadequately addressed (and previous hard work taken to point them out to CAL FIRE has been ignored). However, some will be evident in later comments within this letter. EPFW would be willing to document more of these failures in detail if CAL FIRE shows sincerity in addressing this glaring deficiency in its review and approval process. These standards to which EPFW refers include ones such as these: (a) Each public agency is encouraged to develop and publish thresholds of significance that the agency uses in the determination of the significance of environmental effects. A threshold of significance is an identifiable quantitative, qualitative or performance level of a particular environmental effect, non-compliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect normally will be determined to be less than significant.(b) Thresholds of significance to be adopted for general use as part of the lead agency's environmental review process must be adopted by ordinance, resolution, rule, or regulation, and developed through a public review process and be supported by substantial evidence. Argument, speculation, unsubstantiated opinion or narrative, or evidence that is clearly inaccurate or erroneous, or evidence that is not credible, shall not constitute substantial evidence. Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinion support by facts. CEQA does not require technical perfection in an EIR, but rather adequacy, completeness, and a good-faith effort at full disclosure. A court does not pass upon the correctness of an EIR's environmental conclusions, but only determines if the EIR is sufficient as an informational document. (Kings County Farm Bureau v. City of Hanford (1990) 221 Cal.App.3d 692) On December 13, 2002, EPFW filed comments to CAL FIRE on the Gale THP, which detailed many of these same failures to meet legal standards of review and analysis. However, that THP was approved as submitted without any redress of plan deficiencies. Likewise, all subsequent THPs submitted by SPI to CAL FIRE that EPFW has seen have also been approved as submitted. Given the guidance of the Attorney General in January, 2009, it is now time for CAL FIRE to carry out their obligations seriously. In this case, these obligations require them to deny this plan as submitted.

Response: CAL FIRE would refrain from making legal conclusions with respect to those items of the Concern #26 that are the purview of the court to decide on matters relating to the adequacy of the review and analysis that was done by the Department in conjunction with this particular THP project. However, CAL FIRE would like to point to its recent successful defense of similar projects that were reviewed using similar methodology at the level of the California Supreme Court. CAL FIRE would also like to point out that this THP project, and other THP projects including the "Gale THP", were rarely ever approved as submitted, as alleged in the Concern #26 above. Most, if not all, of these plans were modified during plan review and this includes the current project as well. THP 4-08-005 was

amended, mitigated and added to extensively in response to public concerns and also as a result of reviewing agency concerns. The final plan that was approved is not the same as the plan that was submitted as a result of these amendments and changes that were made during the review process. With respect to the mention in Concern #26 of the January 2009 opinion letter from the office of the Attorney General of the State of California, the opinion was sought by the BOF and was not a product of the Department. As the BOF is the agent that will eventually have the opportunity to promulgate regulations that are consistent with the findings of the January 2009 letter, the Department at this time has only a limited role in the findings as the Department is charged with enforcing the rules of the BOF after rules are adopted and not before. The opinion itself was sought by the BOF in consideration of whether there was regulatory support for the concept of requiring restoration of forest values in the case of so-called "Threatened or Impaired" watersheds. The BOF had previously gone very slowly into the area of requiring forest landowners to make expensive improvements to existing conditions in the watershed, and instead had focused on requiring conditions to not decline any further. It is still not clear how widespread they will choose to apply the findings of the January 2009 letter and whether or not they would apply outside the "Threatened and Impaired" watershed category or even if they will apply them to this category at all. These decisions will be made in a public rulemaking process with ample opportunity for stakeholders and the public to comment. When that process is complete and rules are promulgated and adopted, the Department will be then charged with the duty to enforce the resulting rules on the appropriate THP projects. Meanwhile, the Department understands it's obligations under the existing rules of the BOF and the other applicable regulations to weigh the twin goals of protection of forest resources and production of forest products during the review of this and other THP projects.

27. **Concern:** It was stated that there was unwarranted assertions about habitat and plantations. Please note: EPFW incorporates by reference into this letter all comments and appended material in the Ebbetts Pass Forest Watch and CSERC's Brief (Brief) on Cow Camp (submitted by Michael W. Graf – Case No. C V54240 submitted to the Superior Court, Tuolumne County, on 3/11/09. This document was submitted to CAL FIRE under separate cover from this letter. The Brief states on page 1 that "In approving Cow Camp THP and other SPI THP's in the District, CDF accepts these assertions that plantations will improve wildlife habitat and even relies on them in making its findings that the THP will have no significant impacts on the environment... The problem in this case is that none of these assertions are warranted." The same assertions are made in the Squiggly THP and again, as documented in the Cow Camp Brief, they are not warranted. As stated in the Brief, the record shows that SPI's even-aged management has the potential for significant impacts on wildlife because it eliminates late seral forest and early seral vegetation. The Squiggly THP fails, as did the Cow Camp THP, to reach the status of an informational document under CEQA because it falsely assumes that SPI's conversion of forestlands to even-aged plantations will improve habitat for wildlife. Justification for this assertion for Squiggly is essentially the same as in Cow Camp

and includes:

(a) The THP fails to provide and adequate project description regarding the elimination of important habitat in the project area (p. 16 of Brief)

(b) The THP's project description that SPI's even-aged plantations logging will create late seral habitat over time is inadequate (p. 17 of Brief)

(c) The THP's description that SPI's even-aged logging will create quality early seral "edge" habitat in the near term is inadequate (p. 19 of Brief)

(d) The THP's analysis of cumulative impacts does not meet the informational requirements of CEQA (p. 21 of Brief).

(e) The THP does not acknowledge and thus cannot assess the cumulative impacts to late seral and early seral habitat for wildlife (p 21 of Brief).

(f) The THP fails to consider existing significant impacts as part of its cumulative impact assessment (p. 23 of Brief).

- The THP wrongly assumes that cumulative impacts may be considered incrementally on a THP by THP basis.

(g) The THP's informational failures are prejudicial.

- Failure to disclose relevant information is a prejudicial abuse of discretion where it precludes informed decision making.
- Failure to conduct an adequate cumulative impacts analysis is prejudicial because it precludes the adoption of mitigation measures. (p. 24 of Brief)

(h) The THP violates CEQA by not considering alternatives that would retain valuable habitat in the Planning area. The THP does not consider a timber operations alternative that limits the use of herbicides to ensure that early seral habitat is created on a reasonable portion of even-aged units as the THP claims will occur. As discussed, the THP's assumption that even-aged management will "improve" habitat for wildlife, rather than imposing potentially significant impacts due to loss of critical wildlife components, leads the THP not to consider any alternative that would ensure that such habitat was retained over time in SPI's plantations. This lack of discussion does not foster informed decision making and thus is contrary to CEQA. The key issue is whether the selection and discussion of alternatives fosters informed decision making and informed public participation. (p. 25 of Brief)

Response: To reiterate the comments made in Response to Concern #25 in respect to plantations created as a result of even-age silvicultural treatments, the Department chooses to refrain from commenting on the legal brief submitted to the Superior Court of Tuolumne County in the recent lawsuit against the Department and SPI as this matter is actively undergoing argument and findings at the present time. However, with respect to the comment in the Concern #25 about the assertion in THP 4-08-005 with respect to the wildlife qualities of the plantations that result from the even-age management, CAL FIRE notes the discussions in this Official Response in the Response to Concern #10 above. This response notes the findings of DiTomaso, Joseph M., et al. 1997 in the report: "Post-fire herbicide sprays enhance native plant diversity". ((California Agriculture 51(1):6-11)) This report shows the finding that plant diversity returns quickly in a post fire environment of forest openings even where herbicide has been applied, as should be similar to the treated

openings created during the plantation forestry of this project. The THP itself, on pages 53 – 60, discusses the logic that goes into choosing the silvicultural methods, which includes consideration of the long term benefits to wildlife species and forest diversity. CAL FIRE notes also that the rules of the BOF, especially in Technical Rule Addendum #2, requires an assessment area evaluation of a THP project and that this would include the entirety of the area affected by this particular project in combination with past and reasonably foreseeable future projects. In addition to the even-age treatments, the entire area includes about 43% of the watershed assessment area which is owned by the federal government having a different management goal. The area also includes selection treatments, WLPZ protection areas, and a variety of logged and unlogged areas that create a mosaic of diverse areas over the landscape as a whole, even while recognizing that there are going to be blocks of areas where trees are going to be of a similar age and presumably are going to be similar in height. Taken as a whole, however, even these blocks of planted trees will have a variety of age and heights that are different when comparing one to another given that they are being created over a long rotation age. While there is an allegation that the plan does not discuss late seral or early seral habitat impacts, the term defined by the BOF in 14 CCR Sec. 895.1 is for "late succession forest stands" and not for late seral stage. However, the BOF uses the term "late seral" in conjunction with Technical Rule Addendum #2 where it is only loosely defined. Technically, it is not possible to find that the rules of the BOF require a discussion of "late seral" or "early seral", however, the THP does in various places discuss early seral, open forest, small to medium sized trees, forest density, large trees, The plan extensively includes discussions on the habitat parameters associated with nest, den, maternity and rest sites of species associated with large tree dense forest life form and it should be noted that these species have different habitat needs for each of the different activities so that foraging habitat, for example might be very different than nesting habitat for an individual species as is discussed in the THP for the California Spotted Owl. While the THP does not have late seral stage characteristics in the technical sense and while there is no late succession forest stands being removed by the project, the THP and the surrounding assessment area will still have functional wildlife habitat for dependent species given the WLPZ protections, unlogged areas, past planted areas, uneven-age areas and the 43% of the planning watershed that is federally owned. Functional wildlife habitat, of course, includes recognition that species, even large tree dependent species, do not just need a single type of habitat for each of the different activities that they undergo during their life cycle, as defined in 14 CCR Sec. 895.1 as: "Functional wildlife habitat means vegetative structure and composition which function to provide essential characteristics for wildlife feeding, reproduction, cover and movement between habitats. The habitat components must be in sufficient quantities and arrangement to support the diverse assemblage of wildlife species that are normally found on or use forestlands within that area....".

28. Concern: It was stated that there were inadequacies in the traffic analysis and that THPs in the Southern District consistently lack CEQA information on traffic and

cumulative impacts associated with such traffic. Squiggly is no exception. The Traffic section of this THP is woefully inadequate and does not meet the requirements of CEQA. The hours of operation of logging trucks as well as the numbers of logging trucks and related vehicles are not even estimated. Nor are the cumulative traffic impacts from other local SPI THPs that are likely to be harvested or have been harvested using the same routes assessed.

The THP's informational failures are prejudicial.

- Failure to disclose relevant information is a prejudicial abuse of discretion where it precludes informed decision making.
- Failure to conduct an adequate cumulative impacts analysis is prejudicial because it precludes the adoption of mitigation measures.

RESPONSE: CAL FIRE does not find that the discussion about traffic impacts is any different in THPs typically filed in the Southern Forest District than it is in THPs from the Northern Forest District or the Coast Forest District. The rule requirement for the analysis of traffic impacts is the same in all three districts, and the only place where there might be a different level of discussion is in some of the individual counties where there has been rules promulgated by the BOF on behalf of the county representatives. The rule that applies to all three districts, outside of the special rule counties, is found in Technical Rule Addendum #2 as follows: "Vehicular Traffic Impacts: The traffic assessment area involves the first roads not part of the logging area on which logging traffic must travel. To assess traffic cumulative effects: (1) Identify whether any publicly owned roads will be used for the transport of wood products; (2) Identify any public roads that have not been used recently for the transport of wood products and will be used to transport wood products from the proposed timer harvest; (3) Identify any public roads that have existing traffic or maintenance problems; (4) Identify how the logging vehicles used in the timber operation will change the amount of traffic on public roads, especially during heavy traffic conditions."

The Department found that the discussion in the THP addressed each of these four requirements found in Technical Rule Addendum #2. While the authors of the Concern #28 have repeatedly implied that the THP should evaluate the traffic on major roads where they go through populated areas or traffic all the way to the mill, these are not the requirements of the regulation as the first roads that are not part of the logging area would primarily be Winton Road, which has for decades been used for the purpose of hauling timber. CAL FIRE has previously addressed the traffic issue in the Response to Concern #13 in this Official Response and, in the interest of brevity, will not repeat this discussion here, but will include it by reference.

29. **Concern**: It was stated that there was a failure to give public access to referenced studies. Squiggly, like other THPs examined by EPFW makes reference to and cites as substantial evidence studies to which the public is given no access and, therefore, cannot review and analyze. As stated above on other issues, this is contrary to CEQA

standards since failure to disclose relevant information is a prejudicial abuse of discretion where it precludes informed decision making. Specifically in the Squiggly THP (page 89), SPI references a sighting database. However, past sighting data from this source in this biological assessment area is not included in the THP so that the public can inspect the documents for "validity." EPFW wonders whether the California Department of Fish and Game has had access to this database, specifically data for this biological assessment area, in order to make informed decisions regarding biological resources. EPFW requests CAL FIRE to give us an answer regarding this question.

RESPONSE: While the concern above states that the public has been able to see referenced "studies" (plural), only one incident is actually cited. Therefore, the Department will address only this one example in this Official Response. Not all "studies" or information sources are going to be available to the public in order to keep protected resources from possible harm. For example, most of the information about archaeological resources is kept from the public in order to protect those resources from vandalism. Similarly, DFG does not allow the general public to view their RAREFIND sighting database, although there are ways to pay a substantial amount for subscription to for this service and agree to keep the information private. Some of the terms of the license agreement for RAREFIND are shown below:

You are subject to the following terms and conditions with regard to the purchase and/or use of data from the
California Natural Diversity Database (CNDDB). By installing and using the CNDDB application, you agree
to the following:
1. a. The CNDDB and Spotted Owl databases are proprietary databases owned by the California Department of Fish & Game.
b. You may make copies of CNDDB/Spotted Owl data or database applications in digital or hardcopy
form for use or distribution within your department, agency, business or corporation1. This copy privilege does not extend to professional organizations, associations or affiliations2.
c. Subcontractors may have access to these data during the course of any given project, but they must
not be given a copy for their use on subsequent, unrelated work3.
d. CNDDB/Spotted Owl data may be shared freely between current subscribers.
e. You may not resell, redistribute, or repackage the CNDDB/Spotted Owl data or database application in any form.

Obviously, allowing the general public to have free access to this service could jeopardize the location of protected plant species and/or animal species of special concern. On the other hand, those professionals who write EIRs where protection of species of concern is important to some proposed project and those in agencies that review EIRs, would need access to the database in order to provide protection for these species. The SPI sighting database is thought to be in the same vain to be treated in a

manner similar to the RAREFIND. As this is a product of a private timberland owner, CAL FIRE has not found a compelling reason why the Department should try to force the entire sighting database to be made available to the general public as there is the same need to protect either the plant or animal species of concern. Additionally, since this is a work product from a private business concern, it is not legally clear that CAL FIRE is in a position to require the database to be displayed to the public in the first place, especially where there are locations within the sighting database where there has not been a project proposed. For any individual plan however, where there has been a project proposed that require public review and permit, the information from the sighting database is displayed or discussed, although usually in general terms such as within a certain distance from the project or within a certain section or quarter section.

30. **Concern:** It was stated that there was inadequate herbicide information to determine cumulative impacts. The Squiggly THP is inadequate because it did not supply adequate information about SPI's cumulative herbicide and related chemical use in watersheds from present, past and reasonably foreseeable projects. This is information that should have been supplied by SPI in order to assess impact. As stated above on other issues, this is contrary to CEQA standards since failure to disclose relevant information is a prejudicial abuse of discretion where it precludes informed decision making. Information on past use is available. Detailed analysis of historic usage on acres of clearcuts can be performed using data from the California Pesticide Database or SPI could compile this information from their own records. This data would serve to inform the public as to the expected chemicals and usage rates/acre for clearcuts or similar silvicultural methods. As well, SPI could reasonably estimate expected future use based on past behavior and their knowledge of THPs they intend to file. Without any data being forthcoming from either SPI or CAL FIRE, EPFW has compiled information from the California Pesticide Database on SPI's herbicide use in Calaveras County from 1995-2006. EPFW believes the amount of herbicide and chemical use in sensitive watersheds and forest ecosystems is unacceptable and undoubtedly has as significant impact on the reduction of native plants required for wildlife food and habitat. Yet this critical information regarding historic quantities was prejudicially omitted and therefore did not meet CEQA standards in this THP. EPFW includes the following as an example of the sort of data that should have been made available in this THP:

Summary of SPI's Forestry related chemical use in Calaveras County 1995-2006 (pounds (lbs))
(source: California Pesticide Data Base)

Chemical Name	SPI's chemical use (lbs)
2-(3-HYDROXYPROPYL)-HEPTA-METHYL TRISILOXANE-ETHOXYLATED- ACETATE	6
2-4-D- 2-ETHYLHEXYL ESTER	3,484
2-4-D- ISOOCTYL ESTER	511
ALPHA-OCTYLPHENYL-OMEGA-HYDROXYPOLY(OXYETHYLENE)	188

ATRAZINE	4,459
BUTYL ALCOHOL	35
CLOPYRALID- MonoETHANOLAMINE SALT	7
COMPOUNDED SILICONE	9
GLYPHOSATE	26,308
HASTEN -- surfactant	4,776
HEXAZINONE	9,434
IMAZAPYR	427
INDUCE	6
ISOPROPYL ALCOHOL	17
R-11 SURFACTANT	1,812
SIMAZINE	107
STRYCHNINE	1
SYL-TAC	1,623
TRICLOPYR- BUTOXYETHYL ESTER	279
TRICLOPYR- TRIETHYLAMINE SALT	1,372
TRI-FOL	27
Total (lbs)	**54,888**

The detrimental effects to amphibians from even low exposure to atrazine is well-known. Also well-known is the dramatic decline in amphibian that is being documented in the Sierra Nevada as well as throughout the United States. The following are just some of the many references that could be accessed on this topic:

1. Dalton, R. 2002. Frogs put in the gender blender by America's favourite herbicide. Nature 416: 665-666.
2. Hayes, T.B. et al. 2002. Hermaphroditic, demasculinized frogs after exposure to atrazine at low ecologically relevant doses. PNAS 99: 5476-5480.
3. U.S. EPA. 2001. Atrazine: HED's revised preliminary human health risk assessment for the reregistration eligibility decision (RED). Washington D.C. Pp. 5,7. www.epa.gov/oppsrrd1/reregistration/atrazine/index.htm.
4. U.S. Geological Survey. 1999. The quality of our nation's waters—nutrients and pesticides. USGS Circular 1225. Pp. 60-61, 66.
5. Associated Press. 2002. Weed killer deforms frogs in sex organs, study finds. New York TImes. p. 19A, Apr. 16.
6. Davidson, C., H.B. Shaffer, and M.R. Jennings. 2001. Declines of the California red-legged frog: Climate, UV-B, habitat, and pesticides hypothesis. Ecol. Appl. 11: 464-479.
7. Reeder, A.L. et al. 1998. Forms and prevalence of intersexuality and effects of environmental contaminants on sexuality in cricket frogs (Acris crepitans). Environ.

Health Persp. 106: 261-266.
8. Houlahan, J.E. et al. 2000. Quantitative evidence for amphibian population declines. Nature 404: 752-755.

Adding to the research and credible information is a recent EPA study on detrimental effects of atrazine on frogs. (http://www.epa.gov/espp/litstatus/effects/redleg-frog/atrazine/transmittal-ltr.pdf) Yet in the Squiggly THP on page 114.3, SPI continues to list atrazine as a chemical that it "may use." CAL FIRE, in meeting its mandate listed at the beginning of this letter and given the irrefutable evidence about atrazine's effects and the perilous state of Sierran amphibians, must deny this plan unless this provision is removed from the THP.

RESPONSE: The THP discusses the application of each of the major categories of herbicides that could be used for treatment of unwanted vegetation that could compete with conifer seedling growth during the early formative years. CAL FIRE has also analyzed these major categories in the Response to Concern #13 above, which for the sake of brevity will not be repeated here, but is included by reference as a Response to Concern #30. The discussion in the Response to Concern #13 includes analysis of several studies that are similar to the ones cited in Concern #30, which have found hermaphroditic effects to amphibian (primarily frog) species under certain conditions, which were primarily in intensively managed agriculture conditions.

While Houlahan, J.E. et al. (2000) is cited above as a source of information for the decline in amphibian populations, the report actually shows that declines began in the 1950's and 1960's and that the rate of decline, while continuing, has slowed in recent times. This and other reports also show that declines have occurred in conjunction with development and developed areas as well as where there has not been any development in areas that have remained primitive. The report at http://www.geocities.com/darthdusan/amphibians.htm by Carlos Restrepo (May 2002) states the following as being among the most commonly cited and potentially numerous causes for amphibian population declines:

1. *Geographical and biological characteristics*. Narrow distribution ranges for some species, low densities of some species, highly specialized modes of life, and relatively long life spans with low reproduction rates.

2. *Habitat modification and destruction*. Land use by humans and habitat change caused by practices such as draining of wetlands, regulating the flow of natural bodies of water, monocultural land use by agriculture and the removal or modification of vegetation during forestry operations all have rapid and drastic impacts on affected amphibian populations. For example, it is estimated that clear-cutting mature forests in the southern Appalachian mountains of the United States has resulted in a 9% decrease in Salamander populations. This is due to altered micro-climates, soil compaction and desiccation, and reduction of habitat complexity, all of which are caused by certain forestry practices (Hofrichter, 2000).

3. *Climate change*. Changes in rainfall patterns and temperatures are also believed to be implicated in the decline of several amphibian populations. This is the case with the golden toad, Bufo periglenes, which became extinct in 1987, in the cloud forests of Monteverde, Costa Rica. This extinction occurred after the lowest twelve-month rainfall recorded in 20 years. Extreme weather events may also be the source of some amphibian population declines. For example, the population of a terrestrial Puerto Rican frog, Eleutherodactylus richmondi, declined by 83% after hurricane Hugo in 1989. Declining amphibian populations in Canada may also have been caused by decreases in summer precipitation and increased temperatures and winter rainfall (Alford et al, 1994).

Recent changes in temperature are also believed to have caused amphibian population declines and extinctions in a relatively undisturbed highland forest in Costa Rica. Pounds et al (1999) indicate that twenty out of fifty species of toads and frogs disappeared in a 30 km2 study area in Monteverde national park in 1987. This included the above mentioned golden toad (Bufo periglenes), which became extinct that year. The authors suggest that changes in temperature have led to a dramatic decline in the frequency of dry-season mist since the mid-1970s. Dry weather makes these species of toads and frogs more susceptible to disease and pathogens. As frogs gather near waterfalls and other shrinking bodies of water the probability of them being attacked by parasitic flies increases. Moreover, fungi outbreaks are also more common during these weather conditions.

4. *Acidity and acid rain*. The distribution, reproduction, and egg and larval growth and mortality of amphibians are all affected by the acidity of their aquatic habitats. Sensitivity to acidity varies among species and populations. Increased acidity may result in mortality or in sub-lethal effects such as delayed or early hatching, reduced larval body size, and slower growth rates. Increased acidification of ponds in Britain has caused declines in Bufo calamita populations. Similarly, reduced pH and increased metal concentrations have eliminated salamander larvae in Appalachian streams. Despite the known effects of acidity on amphibians there are few data that link acidification with the recently observed catastrophic declines of various amphibian populations (Alford et al, 1994).

5. *Eutrophication*. This factor is particularly relevant for amphibian larvae. Eutrophication results in increased plant growth. Such conditions result in increased snail populations, which host amphibian trematode parasites. Trematode infestation is believed to cause various deformations in amphibians which reduce their survival rates. This has been observed in North America since the 1990s (Hofrichter, 2000).

6. *Increased levels of UV radiation* . One possible cause of declining amphibian populations that has received much attention is depletion of stratospheric ozone and resultant seasonal increases in ultraviolet B radiation at the Earth's surface. The hypothesis is that there is a relationship between resistance of amphibian embryos to UV-B damage and population declines. It may be that increased UV-B radiation damages DNA and reduces the survival or hatching success of amphibian embryos. There may also be synergistic relations between increased UV-B radiation and other environmental stresses such as pathogens and low pH, both of which reduce embryonic survival. Increased exposure to UV-B radiation may also reduce the survival rates of adult amphibians by damaging their eyes, increasing the probability of developing cancers and tumors, and causing suppression of amphibian immune systems (Alford et al, 1994).

Klesecker et al. (2001) used long-term observational data and field experiments to examine the relationships between inter-annual variation in precipitation, UV-B exposure and infection in amphibians by a pathogenic oomycete (Saprolegnia ferax). They used data from the Pacific Northwest region of the United States, and they studied populations of western toads (Bufo boreas). Their findings suggest that climate-induced reductions in water depth at oviposition sites have caused high mortality of embryos by increasing their exposure to UV-B radiation and, consequently, their vulnerability to infection. These findings suggest that amphibian declines may be caused by a complex series of interactions that involve both physical changes, such as water depth and UV-B exposure, and biotic changes, such as disease outbreaks.

Blaustein et al. (1994) tested the hypothesis that that differential sensitivity among species to UV radiation contributes to amphibian population declines. They focused their research on species-specific differences in the abilities of eggs to repair UV radiation damage to DNA and differential hatching success of embryos exposed to solar radiation at natural oviposition sites. Their study focused on three species: the Pacific tree frog (Hyla regilla), whose populations are not known to be in decline; the Western toad (Bufo boreas); and the Cascades frog (Rana cascadae), both of whose populations have declined markedly. In their field experiments, the hatching success of embryos exposed to UV radiation was significantly greater in the Pacific tree frog than in the other two species. For Western toads and Cascades frogs the hatching success was greater in regimes that shielded them from UV radiation compared to regimes that allowed UV radiation. Hence, these results support the idea that exposure to increased UV radiation plays a role in amphibian population declines.

7. *Toxic substances*. Fertilizers and persistent chemicals such as heavy metals and pesticides can be toxic to amphibians. Examples of such substances include cadmium, mercury, cyanide, and pesticides such as atrazine and 2.4-D. For example, gold mining in South America produces some poisoning of rain forest rivers with cyanide, arsenic, and copper which results in increased amphibian mortality and morbidity (Hofrichter, 2000). However, there is insufficient data to establish the long-term impact of increases in the concentrations of these substances on amphibian populations (Alford et al, 1994).

Nitrate has also been implicated in amphibian declines. Rouse et al (1999) studied environmental concentrations of nitrate in watersheds throughout North America and concluded that out of 8,545 water quality samples in the Great Lakes area, 19.8% had nitrate concentrations that exceeded levels that can cause sub-lethal effects in amphibians. These effects include reduced feeding and mobility, as well as bent tails, body swelling and bulging, head deformities, and digestive-system deformities.

8. *Introduction of exotic species and human predation*. Widespread introductions of predatory fish in habitats where amphibian populations have not developed adequate defense mechanisms are also believed to have caused amphibian population declines. For instance, the introduction of fishes in many high-elevation Sierra Nevada lakes resulted in the rapid extinction of local frog populations. The same is true of newt species. The introduction of predatory fish and crayfish in California mountain streams resulted in the decline of newt species such as Taricha Rosa. Some of the introduced species causing population declines may be amphibians themselves. The expansion in the range of North American bullfrogs has resulted in the decline in populations of other frog species. In addition, humans have caused sharp declines in the populations of several amphibian species for the frog-leg trade. In the early 1990s as many as two-hundred million frogs were exported annually from Asia alone (Alford et al, 1994).

9. *Infectious diseases*. Outbreaks of parasitic disease and high mortality rates have been observed in recent years in England, Israel, Australia, and Central America. Introduced species could be the cause of this, as well as immunosuppression caused by increased levels of pollution and other environmental stresses (Hofrichter, 2000). Amphibian populations are susceptible to outbreaks of pathogenic fungi, bacteria, and viruses. It is believed that population declines in Australia and Central America are associated with viral infections (Alford et al, 1994). In these cases infectious disease appears to be the direct cause of death, mass mortalities are geographically widespread, and populations experience 50-100% mortality. These mass mortality events usually take place at high-elevations and/or in

cold climates. Not all amphibian species in these sites may be affected by disease (Carey, 2000).

Recently, a fungus (Batrachochytrium dendrobatidis) was implicated in these population crashes. These organisms are normally decomposers of organic matter or insect parasites. Their association with amphibian mortality was the first time such a relationship was observed with vertebrates. Although the way the fungus kills amphibians is not properly understood scientists have proposed two hypotheses. The first is that the fungus releases enzymes or toxic compounds that are absorbed through the skin of amphibians. The second is that the fungus disrupts the ability of the skin in various amphibian species to regulate water and electrolyte balance (Carey, 2000).

In addition to fungi, recent mass mortalities of salamanders and frogs have been associated with iridoviruses and associated secondary bacterial infections. In the case of mass mortalities of tiger salamanders in Manitoba, Canada, a new, highly infectious virus was identified. Infection by viruses differs from that of fungi in some important respects. In the cases of viruses the infections tend to be restricted to small geographical areas such as ponds, infections occur more commonly in areas disturbed by human activities, and they take place among high population densities (Carey, 2000).

The susceptibility of amphibians to outbreaks of infectious diseases may be affected by many factors. It is possible that some pathogens have recently undergone natural mutations or genetic recombinations that have made them pathogenic. They may also have shifted hosts through natural processes. However, it is also possible that environmental factors may be facilitating the spread of these pathogens. Among the possible factors mentioned in the literature are temperature changes associated with the El Niño-Southern Oscillation (ENSO), changes in moisture patterns, increased exposure to ultraviolet radiation, and the use of human made chemicals that disrupt the endocrine system of amphibians. Although little is known about the relationship between amphibian immune systems and environmental factors it is believed that these factors may be affecting the immune systems of several amphibian species, thereby facilitating the outbreak of infectious diseases (Carey, 2000).

CAL FIRE has previously investigated the reports of pesticide drift being a factor in causing declines in amphibian populations in the Sierra Nevada in the Response to Concern #13. Part of the response to this concern was with the fact that very few to none of the products used by SPI during reforestation efforts are classified as insecticides, as can be demonstrated from the table produced in Concern #30 above. Another part of the response was from citations of newer studies that have focused on the role of fungi in the decline of

amphibians in the Sierra, and also perhaps world wide. Repeated here for emphasis because of the importance of not automatically assuming that reforestation products are the cause of effects on amphibians, a recent study comes from Roland Knapp (2007). This study focused on the role of chytridiomycosis disease on populations of Rana muscosa and Rana sierrae. From a summary of the report in http://www.mylfrog.info/threats/contaminants.html , "*In California, winds generally blow through the Central Valley and then eastward across the Sierra Nevada, and detectable (but very low) concentrations of several agricultural chemicals have been detected in the Sierra Nevada, including in mountain yellow-legged frogs from high elevations (Fellers et al.2004). Consistent with the hypothesis that pesticides are negatively affecting amphibians, recent studies have reported that the probability of extinction for mountain yellow-legged frog populations is positively correlated with the amount of agricultural land use upwind (Davidson et al. 2002) and the amount of pesticides applied upwind (Davidson 2004; Davidson and Knapp 2007). In addition, numerous reintroductions of Rana muscosa into historically-occupied habitat in the southwestern Sierra Nevada (Tablelands area of Sequoia National Park) have failed, perhaps due to the relatively high concentrations of pesticides characteristic of this area due to its proximity to the southern San Joaquin Valley (Fellers et al. 2007). A shortcoming of all these studies is the inability to distinguish between effects caused by pesticides and those caused by chytridiomycosis. The commonly-reported pattern of mountain yellow-legged frog disappearances in the western Sierra Nevada close to the Central Valley and their continued existence in more eastern localities has generally been attributed to the exposure of western Sierra Nevada populations to higher pesticide concentrations. However, this pattern is also entirely consistent with the amphibian chytrid fungus (Batrachochytrium dendrobatidis) spreading across the Sierra Nevada from west to east, and several observations suggest the overriding role of chytridiomycosis relative to pesticides causing the decline of the mountain yellow-legged frog. The most important of these is the recent B. dendrobatidis-caused die-off of hundreds of mountain yellow-legged frog populations in areas of the Sierra Nevada that are remote from the Central Valley and that are subjected to only very low pesticide concentrations.*"

Another review of this study (Roland Knapp 2007) comes from www.sciencedaily.com/releases/2007/08/070806203309.htm. In this report it states "*Biologists are still determining exactly how this fungus, first identified in 1998, kills the amphibians it infects, but most believe that the pathogen disrupts the frog's ability to absorb water through its skin.*" And "*The findings could help explain the global spread of this pathogen, which has also been found in South America, Australia, Europe and Africa, aid the researchers. While human-caused spread is possible, the fungus has infected amphibians in pristine areas too remote for human activity.*" This document also states that "*The genotype of our fungi in the Sierra are not that different from genotypes found around the world..*" and "*That means there must be someplace else on earth where this fungus is endemic. One would guess that the frogs living where the ancestral population of this fungus is located would not be affected that badly. We could then try to determine the mechanisms those frogs use to resist the pathogen.*"

From another report on the study in www.CaliforniaFarmer.com (Feb 2008), "*This group of fungi can produce spores which last decades, said John Taylor, UC Berkeley professor of*

plant and microbial biology. As resistant spore, the fungus could be transported by animals, including humans or birds, or lay dormant in an infected area until a new host comes along." CAL FIRE finds that the implication of this study as reported in the sources listed in the three paragraphs above places question on the role of pesticide drift on populations of amphibians, and more information is needed.

With respect to surfactants as shown in the table provided in Concern #30, SPI has identified in the THP the commonly used additives (commonly called surfactant or adjuvant) that are something other than the herbicide active ingredient(s). Surfactants are added by the applicator and mixed with the herbicide chemical at the time of application. Also added are dyes to mixes when hand applying herbicides to allow applicators to see where they have applied herbicides. Those additives commonly used by SPI in reforestation efforts commonly include: Hasten, MCO/MSO (both non-ionic esterified vegetable oils), Sylgard 309 (silicone surfactant), Syl-Tac, Dyne-Amic (both vegetable oil and silicone blends), Mor-Act(crop oil concentrate), crop oil concentrate (crop oil and petroleum distillates), R-11 (general wetting agent), and Colorfast Purple (dye). Surfactants and additives are either inert, detergents, vegetable oils, crop oils or petroleum distillates. It is true that detergents can potentially cause environmental harm. However, the reason for such harm is because of the vast quantities of detergents pouring into surface waters from uses having nothing whatever to do with herbicide use. The actual quantity of detergent and vegetable oil additives that are dispersed into the environment is very low in reforestation herbicide application. The THP demonstrates from the results of water quality monitoring that herbicides are not transported off site, and as the surfactants themselves are incorporated in the herbicide, presumably the surfactants would be found at the sites with the herbicide. These additives break down quickly in the forest environment and repeat applications are minimal.

It also bears mentioning again that herbicide use might not take place on the plan area at all, or will not take place on all areas of the project but rather application will be dependent on the naturally occurring conditions that evolve following the harvest of timber. Human exposure will be minimal as the harvest units are generally not open to public use being on private land and there are no indicators that herbicides used on similar SPI lands were detectable by monitoring. However, if there were toxic effects from surfactants these would be expressed in the vastly larger repeat exposures from industrial, agricultural and residential use and perhaps with applicators, the persons who naturally have the greatest exposure to these surfactant products (not-with-standing that at least in forestry the applicators are required by law to wear personal protective equipment that includes boots, long sleeves, eye protection, overalls and gloves and may also include closed respirators, closed cabs or cockpits.) Where particular adverse effects have been documented in the past further study of the product has taken place and where appropriate the product has been removed from use or changes have been made to restrictions on applications. Since these surfactants are utilized on a very widespread basis in exposures that are many multiples of that found in forestry we would expect adverse affects to show up elsewhere long before they show up in forestry. Nothing detected so far would indicate any reason for caution in the very limited applications occurring in the forests.

The surfactant NPE (nonylphenol ethoxylate) is a common ingredient in industrial and domestic laundry detergent used in the United States. NPE metabolites often pass through wastewater treatment plants at a concentration that has been shown to cause harmful effects to aquatic biota in laboratory studies. (Sierra Club, 2005) The studies done by the Environment Canada were as a result of this usage of the product. The Sierra Club reported that in 2004 alone more than 260 million pounds of nonylphenol was used in the U.S., over 80% of that in cleaning products, most notably laundry detergents.

Nonylphenol ethoxylate and its metabolites when associated with herbicide application would not have the same exposure consequences as that described by the Sierra Club with regard to cleaning products used in the home and in businesses. Forest application is vastly reduced volume account for only a small percentage of the total statewide usage. Hence affects from major uses will be detected long before the diminimus use in the forests. Those products are accumulated through waste water treatment facilities and reenter the watercourses as a point source (the wastewater treatment plant outlet) continuously, every day for years on end. In the forest the surfactant nonylphenol ethoxylate would be applied in small quantities as a minor portion of a tank mix to be applied to a specific treatment area. Such treatments would be on the order of once or twice over a period of five to eight decades. Initially there would be no mechanism for the material to move from the site. Even under conditions of heavy rain, if it were to occur, the exposure to watercourses would not replicate that described above for home and business use of NPE as a cleaning product. The chemicals (surfactant and/or its metabolites), if any were transported from the treatment area (through the extensive buffer zones) would be swept from the watercourse system in the high flows that would accompany the heavy rainfall that made the translocation of the materials possible. If herbicides, with or without surfactants, are used they would be applied in small quantities either in areas exposed to direct sunlight and naturally occurring biological decomposing agents or under the bark of trees (hack and squirt) where it would be protected from rainfall and translocation but would be exposed to naturally occurring biological decomposing agents. Surface water monitoring has not detected levels of chemicals on similarly treated SPI forestlands. While this testing was not specific to surfactants it does imply if the active chemical ingredient was not found which is in a higher concentration in the tank mix, likely the lesser concentrated surfactant was not leaving the site either.

In summary, surfactants commonly used in forestry herbicide applications as indicated in other responses are unlikely to come in contact with the general public. Fensterheim (2000) reported that nonylphenols have a short half-life in the environment, further limiting the potential for adverse impacts. SPI has listed the surfactants that are generally used on its lands as being Hasten, MCO/MSO (both non-ionic esterified vegetable oils), Sylared 309 (silicone surfactant), Syl-Tac, Dyne-Amic (both vegetable oil and silicone blends), Mor-Act (crop oil concentrate), crop oil concentrate (crop oil and petroleum distillates), R-11 (general wetting agent), and Colorfast Purple (dye). These products are used to lessen herbicide drift and to make the application more efficient by keeping the herbicide in contact with the intended target.

31. **Concern:** It was stated that there was a lack of threshold of significance for assessing impacts of even age silviculture in the planning watershed. Page 74 of Squiggly gives information about the Lower Blue Creek Planning Watershed. It states that the watershed's total acreage as 8,320 acres. There is also a table listing THPs conducted in the watershed, with silviculture methods described. This table shows that since 1997, 1,792 acres of the Lower Blue Creek watershed have been clearcut or near clearcut. This is 22% of the watershed and 39% of SPI's ownership (1,792 of SPI's 4,617acres). Squiggly's proposed 369 acres of clearcuts would bring the percentage of the watershed clearcut or nearly clearcut to 25% (2,161 acres or over 3 square miles) EPFW earlier cited the CEQA requirement to establish a threshold of significance in order to assess potential or actual significant impacts. Yet, there is no threshold of significance set forth by CAL FIRE in the THP as to when any potential significant impacts to biological, water, aesthetic, and economic considerations required by the FPA that might occur from the intensive harvest over a quarter of the watershed within such a short period of time. This is contrary to CEQA standards since failure to set standards such as thresholds of significance is a prejudicial abuse of discretion where it precludes informed decision making. The rate of cut by SPI is another issue that needs addressing by CAL FIRE. SPI's harvest by clearcut and near clearcut methods of 40% of their ownership in this planning watershed within less than 12 years would imply they are pursuing a rotation age in this region of closer to 30-40 years than the 60-80 years they state on page 76 of this THP. While their Option A document covers their entire ownership across the state, activities within Calaveras County and specifically in the Mokelumne watershed appear to be receiving a much faster and intense rate of harvest than that document would imply. Because of the multiple impacts of this accelerated rate of harvest in a specific part of their ownership, EPFW requests CAL FIRE to conduct an analysis of rate of harvest in the Calaveras County and to make that analysis public. Page 111 of the Squiggly THP that shows SPI's intended (forseeable projects) plans in the Mokelumne. They would add 10,794 acres of additional harvest into the watershed. SPI's statements in this THP and elsewhere indicate a majority of this would be by clearcut or near clearcut methods. Currently, THP submissions from SPI are 80-90% clearcut or near clearcuts. This intended harvest would add in the neighborhood of 6,000-9,000 more acres of clearcuts in addition to what is already on the landscape. As well, the percentages of the harvest to be accomplished through cable yarding would potentially indicate areas of extreme steepness or close to waterways. Again, CAL FIRE has not set any "threshold of significance" for when this harvest might pose a potential significant impact, despite CEQA's requirement that they do so. EPFW believes that the amount of evenage harvest and plantation creation happening in the Lower Blue Creek and other Calaveras watersheds is not in accordance with State law. There is no consideration of the fact that the Forest Practice Rules require the following standard for implementation of the FPA's intent:

> 897b) In determining whether a THP conforms to the intent of the Act, the Director shall be guided by the following principles:
>
> (1) The goal of forest management on a specific

ownership shall be the **production or maintenance of forests which are healthy and naturally diverse, with a mixture of trees and under-story plants,** in which trees are grown primarily for the production of high quality timber products and which meet the following objectives:

(A) Achieve a balance between growth and harvest over time consistent with the harvesting methods within the rules of the Board.

(B) Maintain functional wildlife habitat in sufficient condition for continued use by the existing wildlife community within the planning watershed.

(C) Retain or recruit late and diverse seral stage habitat components for wildlife concentrated in the watercourse and lake zones and **as appropriate to provide for functional connectivity between habitats.**

(D) Maintain growing stock, **genetic diversity, and soil productivity.**

(2) **Individual THPs shall be considered in the context of the larger forest and planning watershed in which they are located, so that biological diversity and watershed integrity are maintained within large planning units and adverse cumulative impacts, including impacts on the quality and beneficial uses of water are reduced.** (Emphases added)

RESPONSE: Regarding the actual amount of harvest in the Planning Watershed over the past ten years, the table in the plan contains acres of logging for THP 4-00-85. However, this plan was withdrawn and was never approved. Also, most of THP 4-98-118 is actually located outside the Planning Watershed and all but 37 acres of this plan need to be subtracted from the totals as well. The result is that the amount of logging in the Lower Blue Creek Watershed before the submission of THP 4-08-005 is 15% of the watershed for uneven-aged silviculture (1203 acres) and 14% for even-aged silviculture (1127 acres). With the approval of THP 4-08-005, the total is still 15% for uneven-aged (1257 acres) and 18% for even-aged (1511 acres). Therefore, the total for all types of logging in the past ten years including THP 4-08-005 would be 2768 acres, or 33% of the planning watershed. While the comment in Concern #31 is that, since 1997, 1,792 acres of the Lower Blue Creek watershed have been clearcut or near clearcut and this represents 22% of the watershed and 39% of SPI's ownership (1,792 of SPI's 4,617acres); the actual total for clearcut (plus alternative to CC and STSS) is 1401 acres which is 17% of the watershed and 30% of SPI lands in the watershed. (see also the Response to Concern #25)

As to the allegation that there is no "threshold", the Department notes the definition in the rules of the BOF in 14 CCR Sec. 895.1 for a significant adverse impact on the environment which means: "...a substantial, or potentially substantial, adverse change in any of the

physical conditions within the area affected by the project..." as the threshold as defined by the BOF. (see also the Response to Concern #25)

With respect to the table on page 111 of the THP showing potential future projects in the Mokelumne watershed, several of the plans have already been approved and are more clearly thought of as past or present projects rather than future projects. SPI has an approved Option "a" plan that revels the intent to manage their timberlands in a manner that will result in maximum sustained production as discussed in the Response to Concern #25 and which will not be repeated here for the sake of brevity.

With respect to 14 CCR Sec. 897(b), CAL FIRE understands its obligations under the rules of the BOF to review plans and approve projects in light of this and other regulations and finds that the elements of the individual requirements of Sec. 897(b) have been discussed at length in this Official Response and in the THP itself. Likewise, the plan has been appropriately reviewed in light of the larger planning watershed, including a described planning watershed and a separately described biological watershed, and in some cases, a much larger area including, evaluation of the entire Mokelumne watershed and some areas beyond. (see all other Responses in this Official Response)

32. **Concern:** It was stated that there were misleading and inaccurate peak flow discussions and analysis. Page 86 of Squiggly THP states: The plan area and assessment area is located at relatively moderate to low elevations. "Rain on snow" events are common in this area. However some rain on snow events can cause peak flows. Adequate vegetation will remain on the ground after harvest for interception of rain. In addition there will be limited harvest (selection) in Class I WLPZ and Class II WLPZ, thus retaining much of the WLPZ interception vegetation. No significant change in peak flows is expected as a result of the proposed project. This appears to be an admission of a potentially significant impact. However, the only mitigation or perhaps mitigating factor discussed is that in the WPLZ they will only be doing selection harvest, which will, by their assertion (no real evidence provided as required by CEQA) mitigate this impact. Harvesting in the riparian areas, selection or not, will lessen the amount of vegetation in those areas (both trees and groundcover) as well cause some disruption of soil and other factors that could certainly impact water flow over the harvest units. This is not a mitigation backed up by any credible or meaningful evidence. Rather, it relies on unsubstantiated opinion, which is contrary to CEQA requirements. As well, the THP statement about peak flow is very misleading because it states that in the 369 acres of SPI's clearcuts there will be adequate vegetation on the ground after the clearcutting to intercept rain. The preceding aerial photo of the very area in which this THP is proposed to be located graphically depicts the amounts of vegetation left on the ground after SPI's clearcutting, some of which is six or more years post-harvest. There is no indication that Squiggly will be different than those harvests visible in the photo or that more vegetation will remain on the ground and there are no other sections of this THP that explain how vegetation will be preserved. It would appear that the assertion to the contrary is misleading at best and untrue at worst. Once more, EPFW reminds CAL FIRE about the CEQA standard: Argument,

speculation, unsubstantiated opinion or narrative, or evidence that is clearly inaccurate or erroneous, or evidence that is not credible, shall not constitute substantial evidence. Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinion support by facts. The THP reveals that the area is prone to rain on snow events and that a significant or potentially significant impact for erosion from runoff exists within this THP. However, this serious consequences of clearcutting 369 acres has been not adequately assessed for public review in this THP as required by CEQA. As well, no threshold of significance is established and no meaningful evidence presented.

The THP's informational failures are prejudicial.

- Failure to disclose relevant information is a prejudicial abuse of discretion where it precludes informed decision making.
- Failure to conduct an adequate cumulative impacts analysis is prejudicial because it precludes the adoption of mitigation measures.

EPFW wishes to remind CAL FIRE that several times they have submitted documents containing valuable data on the Mokelumne River to CAL FIRE. These have included the Foster Wheeler Environmental Report on the Mokelumne River which was prepared for SPI as well as the UC Berkeley College of Natural Resources dissertation by Frederick Euphrat on Water Effects in the Middle Fork of the Mokelumne River. These studies provide insight into the phenomenon of peak flows, relevant to the THP at hand. EPFW believes that if CAL FIRE carefully considers the information they contain, they will conclude as EPFW has, that continuing to allow widespread clearcutting in the Mokelumne River does not meet the legal and resource standards to which they are held.

Here are some passages from those works relevant to this discussion: From the Foster Wheeler environmental report:

> One factor influencing the extent of the snowmelt during a rain-on-snow event is timber stand composition; large open areas of snow allow warm, turbulent air to flow across the snow surface transferring latent heat directly from the warm air and latent heat from condensation of moisture into the snowpack (Berris and Harr 1987). A study that compared the effects of timber harvest practices on peak flows in two Sierra Nevada watersheds, showed an increase in peak flows following a forest canopy reduction of 58 percent. The amount of peak flow increase was not quantified due to limited data. The author also concluded that an increase in exposed snowpack allowed for greater heat transfer into the snowpack contributing to increased peak flows (Marvin 1996).

From the Euphrat dissertation:

"In 1928, Bates and Henry published the results of a 15-year study on the

effects of clearcutting in Colorado snow-zone watersheds. Their results were similar to many other studies, from the Paulini brothers to the present—cutting increases peak flows and increases sedimentation from watersheds." (Euphrat, 14) (reference to Bates, C.G. and A. J. Henry. 1928. "Forest and streamflow experiment at Wagon Wheel Gap, Colorado: final report, on completion of the second phase of the experiment." Monthly Weather Review, Suppl. 30. USGPO, Washington, D.C. 66pp.)

"Bare ground is a potential source area for stream sedimentation, because machine-operated ground creates surfaces of relatively lower permeability over which overland flow is more likely to carry sediment." (Euphrat, 69)

"Significant differences were found between the clearcut and selectively harvested sites...All of the sites had been tractor-harvested...Most notably, clearcut sites had significantly more equipment-operated ground than selective-harvest sites....[T]ransects of harvest areas showed a difference in the amount of bare ground between selection and clearcut sites, significant at the 90% level...indicative of probable source areas for sediment transport." (Euphrat, 70)

Harr et al. "Found that...clearcutting increased storm runoff in coastal Oregon watersheds." (Euphrat, 56)

"This suggests that, per unit of ground, the potential for stream channel effects from surface soil erosion is greater on clearcuts." (Euphrat, 100)

For the Middle Fork of the Mokelumne, "Blanchard has already suggested that, for the period 1930 to 1960, total water yield increased. He attributed this to the removal of vegetation by timber harvesting, and anticipated an increased water yield of 4 to 6 inches, or 20%." (Euphrat, 45)

Euphrat found that "the 20% increased yield that had occurred, ... according to Blanchard, continues still. What is notable, however, is the increased spread (heteroscedasticity) of the data; lows are lower and highs are higher...The increase in variation over time appears to be most marked beginning at water year 1971...[current Forest Practice Rules began in 1972] [O]ver this period of time, the streams are producing both <u>more</u> water in wet years, and <u>less</u> water in dry years. Interestingly, this effect of timber harvesting was a principal argument for conservation at the turn of the century, and a reason for which the reservation of forest area was justified by the fledgling Forest Service." (Euphrat, 46-47)

"Annual water balances [in the Middle Fork of the Mokelumne] show increasing heteroscedasticity over time, significant at the >95% level for all streams, and >99.5% level for the South and Middle Forks, based on a longer record. The increased absolute value of residuals suggests that, over this

period of time, the streams are producing both more water in the wet years, and less water in the dry years

"-Large Storms: Total quick runoff from storms has gotten larger over the period 1941-1990 (the period of record for this study), with significance at the 99% level or greater. Storm temperature and rainfall intensity are not correlated with this time period, although road mileage and harvested area are. Increased peak flows may decrease streambank stability, and are a serious geomorphic concern in linear, unstable alluvial basins such as Forest Creek.

"-Low Flows: Lowest daily and weekly flows are decreasing with time, significant on Forest Creek at the 95% level and on the South Fork at the 99.99% level. This impact was attributed to increased storm runoff and aggradation effects in small streams, the latter both lowering net output and increasing evapotranspiration loss. Small streams appear to be most affected by and the least able to recover from this phenomenon. Lowered flows are important to riparian and aquatic habitats available in the streams of the lower Mokelumne watersheds.

"-Channel conditions: Small streams that were evaluated were moderately to severely aggraded" (Euphrat, 101)

Another significant issue within the Mokelumne is the change in water yields. Euphrat's "data show that runoff from large storms in the Mokelumne watershed has significantly increased over the period 1930-1980, the period in which these basins experienced timber harvesting and roadbuilding activities. Because the effect does not appear to be flattening over time, the change in runoff characteristics may well be tied to timber harvesting as well as road densities. Timber harvesting affects runoff by its reduction of vegetation cover and subsequent impacts on the snow pack. It may be fair to say that more recent timber harvesting, affecting annually and cumulatively greater and greater areas, combined with roads, skid trails, and tree removal, is creating progressively greater runoffs from large storms, with the largest storms displaying the greatest increase of runoff." (Euphrat, 56)

"The increased runoff and high significance in the extreme portions of this storm population show that peak flow changes in the mid-elevation Mokelumne are greatest during extreme events. This could be due to sediment additions from roads, from the change in runoff created by forest openings, or from the road surfaces themselves. The warm rain-on-snow storms, the topography, and the dense road network all make the Sierra different from other regions. Clearly, more research is needed in this region, on both control and treated watersheds, to determine the relative contribution of each of these variables to peak runoff events and sediment transport." (Euphrat, 57)

"The weekly low-flow data from Forest Creek and the South Fork Mokelumne showed decreases over time significant at the 95% level." (Euphrat, 60)

"The lowering of the lowest weekly flows, significant on Forest Creek at the 95% level, and on the South Fork at the 99.99% level, is important in terms of the riparian and aquatic habitats available in the streams of the lower Mokelumne watersheds. For fish and other aquatic species, decreased low-flows reduce available living area and increase temperatures through lack of dilution. For riparian species, low-flows change habitat close to stream channels and allow more species that cannot tolerate perennial flooding to live adjacent to the stream. For people and animals, it restricts the amount of water available for consumption and lowers its quality, through heat and associated eutrophication." (Euphrat, 60)

"Observation of stream channels, as was conducted in the watershed survey, suggested that low summer flows in smaller channels are more discontinuous now than under original conditions...It appeared that a small stream, unprotected, would rapidly move from perennial to ephemeral, or from Class I to Class III under California Department of Forestry definitions." (Euphrat, 60-61)

Application of Cumulative Impact Framework to the Middle Fork of the Mokelumne

Long-term fishery effects: "Low flows are becoming lower, leading to elevated water temperatures...Compound effects on Forest Creek and parts of the Middle Fork are also significantly changing the shape of the stream channel and its banks

" Significant effect: Elimination of anadromous fishery; severe reduction of local cold water fishery." (Euphrat, 95)

Effects as Documented by ERA [Equivalent Roaded Area] Assessment Levels:

"Significant effect: Impact scores will be high in basins that receive a concentration of clearcutting and have a higher than average road concentration.

"No effect: Areas with low road density or dominated by selective harvesting will continue to have low scores. "(Euphrat, 97)

"6.2% of the capacity of Schaad's reservoir has already been lost to sedimentation (50 years). Reconstruction of road crossings following floods, erosional accidents, and road surface erosion will continue to contribute sediments at relatively high rates. Land use adjacent to water

flow paths provides other aggravating inputs." (Euphrat, 98)

"1.8% of Pardee Reservoir has been lost to sedimentation to date (64 years). (Euphrat, 98) "Notably, the data indicate that the apparent sedimentation rate in Pardee Reservoir has nearly doubled since the 1940s." (Foster Wheeler, 45) Sedimentation in upstream reservoirs is probably higher than for Pardee. "Erosion rates for the upper Middle Fork, calculated via a sediment budget for Schaad's reservoir, are mid-range for Sierran watersheds, and about 25% greater than for Pardee reservoir." (Euphrat, 94)

Another assessment of water effects on the Mokelumne was prepared for Calaveras County Water District. The following is information from that report on erosion potential from SPI's logging:

"The impact of private logging activities on surface waters in the sub-watersheds [of the Mokelumne] is characterized by Foster Wheeler Environmental as low since the majority of harvestable lands occur on slopes that are less prone to erosion. However, since only two of the several factors that influence erosion were considered in their assessment, and some level of uncertainty prevails regarding the other factors that affect erosion that were not included in their assessment (e.g., rainfall intensity, slope length, vegetative cover), a more conservative low-medium level of potential impact should be applied to the effects of logging in the sub-watersheds." (Tetra Tech 5-11)

These references from credible sources provide a framework within which EPFW looks at water impacts in the Mokelumne. EPFW looks forward to seeing a lengthier disclosure from CAL FIRE that delineates their assessment format for reviewing and analyzing submitted THPs.

RESPONSE: The Department has previously discussed the analysis of peak flow and conditions in the Mokelumne watershed in the Response to Concern #4 in this Official Response. The THP itself analyzes the condition of the watercourses within the planning area for the project using the BOF methodology described in Technical Rule Addendum #2 as found on THP pages 77 – 87. The watershed is described as being in relatively good condition. While the concern above includes partial citations from various studies and reports which show what might happen or what could happen with speculation, the THP and this Official Response includes the actual on-the-ground findings with respect to the current condition of the watershed as required by the rules of the BOF.

The THP itself, the rules of the BOF and other applicable laws provide protections for the beneficial uses of water. For example, the rules state that the "quality and beneficial uses of water shall not be unreasonably degraded by timber operations. During timber operations, the timber operator shall not place, discharge, or dispose of or deposit in such a manner as to permit to pass into the water of this state, any substances or materials, including, but not

limited to, soil, silt, bark, slash, sawdust, or petroleum, in quantities deleterious to fish, wildlife, or the quality and beneficial uses of water." (14 CCR Sec. 956.3) Regulations specify spacing of waterbreaks to protect from soil movement, widths of WLPZs and Equipment Limitation Zones to keep equipment away from watercourses, treatment of watercourse crossings, and also treatment of bare areas within the WLPZ of Class I and II watercourses and many more provisions. Numerous studies in the literature document that overland transport of sediment will be mitigated by the WLPZ and ELZ on watercourses. The Board of Forestry and Fire Protection's Monitoring Study Groups report on Hillslope Monitoring Program says in the executive summary; "*In summary, the Forest Practice Rules and individual THP requirements (i.e., site-specific mitigation measures developed through recommendations of interagency Review Teams) were generally found to be sufficient to prevent hillslope erosion features.*" (Available on the Internet at www.fire.ca.gov, then follow the links to the Board of Forestry and Fire Protection, and then to Monitoring Study Group page.)

The soil stabilization and watercourse protection measures in the THP are designed to protect the quality and beneficial uses of water. Other regulations of the Board come into effect concerning protection of water quality. For the purposes of analysis, the State's waters are grouped into four classes based on key beneficial uses. These classifications are used to determine the appropriate minimum protection measures to be applied to the State's waters during the conduct of timber operations. The measures used to protect each watercourse and lake in a logging area shall be determined by the presence and condition of the following values:

- The existing and restorable quality and beneficial uses of water as specified by the applicable water quality control plan and as further identified and refined during preparation and review of the plan.
- The restorable uses of water for fisheries as identified by the DFG or as further identified and refined during preparation and review of the plan.
- Riparian habitat that provides for the biological needs of native aquatic and riparian-associated species as specified in 14 CCR 956.4(b).
- Sensitive conditions near watercourses and lakes as specified in 14 CCR 956.4(a).

A combination of the rules, the THP, and mitigation measures shall provide protection for the following (14 CCR 956.4(b):

a. Water temperature control.
b. Streambed and flow modification by large woody debris.
c. Filtration of organic and inorganic material.
d. Upslope stability.
e. Bank and channel stabilization.
f. Spawning and rearing habitat for salmonids
g. Vegetation structure diversity for fish and wildlife habitat, possibly including but not limited to:
    - Vertical diversity
    - Migration corridor
    - Nesting, roosting, and escape
    - Food abundance
    - Microclimate modification
    - Snags
    - Surface cover

These values shall be protected from potentially significant adverse impacts from timber operations and restored to good condition, where needed, through a combination of the rules and plan-specific mitigation. The RPF has provided the following protection measures for classified watercourses on the THP area:

Watercourse Characteristics, Classifications and Protection Measures Provided For By this THP.

Water Class Characteristics or Key Indicator Beneficial Use	1) Domestic supplies, including springs, on site and/or within 100 feet downstream of the operations area and/or 2) Fish always or seasonally present onsite, includes habitat to sustain fish migration and spawning.			1) Fish always or seasonally present offsite within 1000 feet downstream and/or 2) Aquatic habitat for nonfish aquatic species. 3) Excludes Class III waters that are tributary to Class I waters.		No aquatic life present, watercourse showing evidence of being capable of sediment transport to Class I and II waters under normal high water flow conditions after completion of timber operations.		Man-made watercourses, usually downstream, established domestic, agricultural, hydroelectric supply or other beneficial use.
Water Class	Class I			Class II		Class III		Class IV
Slope Class (%)	Width Feet	Protection Measure (1)	Protection Measure (2)	Width Feet	Protection Measure (1), (2) & (3)	Width Feet	Protection Measure	Protection Measure Site Specific
<30	75	N/A	ABDG	50	BEI	25 ELZ	CFHJK	N/A
30-50	100	N/A	ABDG	75	BEI	50 ELZ	CFHJK	N/A
Tractor >50	150	N/A	ABDG	100	BEI	50 ELZ	CFHJK	N/A

See Section below for letter designation application to this table.

"A" A WLPZs on slopes greater than 50% were flagged prior to the preharvest inspection therefore allowing inspection of these areas at that time.

"B" For Class I watercourses with slopes less than 50% and Class II watercourses, all WLPZs will be clearly identified on the ground by the RPF who prepared the plan or a supervised designee, with paint, flagging or other suitable means prior to the start of timber operations on these slopes.

"C" The ELZ will be flagged prior to the start of operations an RPF or supervised designee.

"D" To ensure retention of shade canopy and filter strip properties of the WLPZ and the maintenance of a multi-storied stand for protection of the values described above, a base mark below the cutline of residual or harvest trees within the zone has been completed prior to the preharvest inspection by the RPF who prepared the plan or his supervised designee. This allowed the forest practice inspector to review the actual mark and subsequent retention within these areas.

"E" To ensure retention of shade canopy filter strip properties and the maintenance of wildlife values described above, a base mark shall be placed below the cut line of harvest trees within the zone and shall be done before timber falling operations by the RPF who prepared the plan, or his supervised designee.

"F" ""Retention standards within the ELZs shall be a minimum of 50% if the understory vegetation shall be retained. No trees less than 10" DBH will be harvested within the ELZ.

"G" To protect water temperature, filter strip properties, upslope stability and fish and wildlife values, at least 50% of the overstory and 50% of the understory canopy covering the ground and adjacent waters shall be left in a well distributed multi-storied stand composed of a diversity of species similar to that found before the start of operations. The residual overstory canopy shall be composed of at least 25% of the existing overstory conifers.

"H" ""Logs will be endlined out of the ELZs. No additional skid trails will be constructed the ELZ. This will aid in the retention of the filter strip properties of the zone.

"I" To protect water temperature, filter strip properties, upslope stability, and fish and wildlife values, at least 50% of the total canopy covering the ground shall be left in a well distributed multi-storied stand configuration composed of a diversity of species similar to that found before the start of operations. The residual overstory canopy shall be composed of at least 25% of the existing overstory conifers.

"J" Class III skid trail crossings will not be used if water is present and any mineral soil that is exposed at these crossings to the extent it becomes necessary to stabilize the area; will be done as prescribed by the soil stabilization measures described under Item #18 of the THP.

"K" No site preparation using equipment shall occur within the ELZs.

All watercourses in the plan area have been identified and afforded a protection zone. Zone widths were determined, by the Registered Professional Forester as per 14 CCR 956.5, based on the classification of the watercourses and slope steepness. The RPF establishes Equipment Limitation Zones along class III watercourses within the project area. Specific mitigations were requested by the Review team and agreed to by the proponent to address erosion concerns. Road construction was determined to be reasonable for access and will not result in any adverse impact to water quality or the beneficial uses of water.

A report was done by CH2M Hill on the drinking water quality at While Pines Lake in Calaveras County (Gaston 2001) in order to determine the impact of harvest in the USA Creek THP, which is the subject of much controversy in the Ebbetts Pass area. The THP consisted of about 40 clearcut and alternative prescription variable retention areas within the San Antonio Creek drainage. Water samples were taken during the winter period from October 26, 2000 until April 5, 2001 and compared to those taken by the Calaveras County Water District from January 1995 through March 2000. The mean water pH measured by the CCWD for the period was 7.0 or neutral. The mean raw water turbidity during the same period was 2.4 NTU with a high reading of 16.5 NTU and a low reading of 0.07 NTU. For the CH2M Hill readings, the pH varied from 6.51 to 7.32 and fell within the "neutral" range. The turbidity figure ranged from .1 to 17.9 with the higher figure occurring during the spring runoff as a one day event that was bracketed by days of lower readings. "*The readings do no indicate contamination of the water source from turbidity or pH. Inspection of the data for dissolved oxygen, temperature and specific conductance do not indicate any variance from the expected values. Dissolved oxygen is high, demonstrating a healthy environment;*

temperature is normal for this time of year, and the specific conductance is low indicating that there is no "salt" load going into the creek." (Gaston 2001)

The publication "Water and The Forest Service" (Sedell et al) points out the complexities of managing forest systems for water yield and quality. The report states that water yield can be increased by removing vegetation and trapping additional snow. However, it goes on to state that "*Although water-yield increases can result from forest management activities, the increases produced by normal silvicultural methods applied in the context of multiple use are modest. Even in the wet environments of...the Sierra Nevada....these increases could be in the range of 6 percent, if water yield was strongly emphasized, but more likely 1 percent under normal management.* ***Detecting and measuring this small change is outside the limits of current technology*** (emphasis added). *The most productive areas for this potential would have the shortest duration because of rapid re-growth of vegetation reoccupying the site.*" The report also discusses the difficulty of measuring the effects of land management activities on water quality....."The lack of precision and reliability limits the utility of the TMDL process in allocating loads to specific management practices or to individual landowners in forest and range land settings. *Creative approaches will be needed to salvage useful gains from a legal framework that was designed for point-source pollution control and fits non-point source control poorly.*" With respect to roads, which are often appear to be the biggest single contributor to sedimentation in a typical Sierra watershed, the report admits that "*Research has shown that improved design, construction, and maintenance can reduce the effects of roads on water quality, wetlands, and watershed function. Remarkably little is known about road effects on hydrology at watershed and sub-basin scales, so there is inadequate basis to evaluate the hydrologic functioning of the road system at large scales. Analytical techniques need to be developed further.*" CAL FIRE tends to agree with the conclusions noted above as presented in the report for Forest Service lands, and although the report is very general in order to be applicable to federal lands that exist through-out the entire United States where conditions can vary greatly, the Department finds that the conclusions noted above are similar to it's own observations and in the Hillslope Monitoring Study for private timberlands in the central and southern Sierra Nevada.

Findings by Euphrat quoted in the Concern #32 including a statement that peak flows are increased by timber harvesting and road building. Also, lower low flows can be found in some of these harvested watersheds. These potential effects are acknowledged by CAL FIRE along with possible effects from rain-on-snow events. However rain-on-snow events are not predictable given our current meteorological technology. These events do not occur on any schedule. Clearcut areas, which are regulated by the BOF in size and spacing and over time, are reforested in a timely manner in accordance with the rules and are therefore not "bare" areas in the long-term. Clearcut areas themselves in their infancy are also not totally "bare" and there is vegetation remaining on the surface of the soil in the form of chips, branches, stumps, slash, and other vegetative matter. Likewise, there are mineral remains on the surface of the soil in the form of rocks which tend to break up the soil surface and intercept raindrops. The degree of the effects from rain-on-snow or peak flows is in question and it has not been a determined that a threshold has been reached where there is evidence of significant adverse environmental impacts. Many of these quoted

findings from Euphrat were done based on a logging rate that was prevalent prior to 1992 and which have changed significantly over time and decreased as has been shown in the Response to Concern #21. In addition to decreases in the overall statewide logging rate that have occurred when comparing 1990 levels with current levels, there have been marked decreases in the amount of timber volume harvested in the areas of the Southern Forest District where SPI is the primary industrial timberland owner and also in the areas of the State that include the Mokelumne River drainage. As proof, CAL FIRE has examined the information produced by the Timber Tax Division of the California State Board of Equalization on the following table:

	1994	2000	2006
AMA	26,232 MBF	28,423 MBF	27,274 MBF
ELD	129,130 MBF	107,498 MBF	99,508 MBF
CAL	49,663 MBF	49,070 MBF	33,523 MBF
TUO	93,489 MBF	61,061 MBF	48,392 MBF

The totals for the four counties where SPI is the primary private industrial timberland owner has therefore had a decrease in logged volume from 298,514 MBF in 1992 to 208,697 MBF in 2006, which is a decrease of 30%. For the three counties where SPI has an ownership in the Mokelumne drainage, the change has been from 169,384 MBF in 1992 to 109,189 MBF in 2004, which is a decrease of 36% from the high levels of logging in the past. Clearly, the information about peak flows/low flows/rain-on-snow as cited from the reports and studies of 1992 as shown in the Concern #32 have likely changed substantially given these much lower levels of harvest as demonstrated by the 2006 figures from the Timber Tax Division (the most recent year for which statistics have been compiled and published).

The rules of the Board of Forestry and Fire Protection, Water Quality Control Board and other regulations address many of the potential impacts and individual THP review focuses on offsetting the impacts from new disturbances by making improvements in existing conditions where ever that is feasible to do. As noted in the Response to Concern #4, the information presented in the South Fork Tule River Study cautions about increases in peak flows within headwater streams in the forested zone where channel morphology could be negatively impacted. The report states that *"More research must be done in order to determine the potential negative effects of clearcutting on runoff and flow. Until these consequences are determined, it would be wide to proceed with caution."* This would seem to be a reasonable conclusion and CAL FIRE's review of THP's, done in accordance with the applicable rules and regulations, include the findings from field observations (inspections) made by the Department over the years on past THP's which have been designed to identify problems that might adversely impact the quality and beneficial uses of water and show were additional mitigations might be needed on current and future projects. Additionally, the THP submitter is responsible for conducting an actual on-the-ground assessment of conditions that exist in the watershed area. The RPF's detailed watershed assessment area complies with that as outlined by the BOF.

The development of the Cumulative Impacts Analysis (CIA) regulations began as early as 1980 with the creation of the Board's first Cumulative Effects Task Force (Richey, 1982) and ended with the approval of the Board's regulations in 1991. The Board's first Cumulative Effects Task Force made the following recommendations in their report after reviewing all the regulatory alternatives available to the Board for addressing cumulative impacts;

- Effective on-site best management practices, including special attention to sensitive lands, are the most direct method to avoid cumulative effects and should remain the backbone of the regulatory program. (Richey, p.13)
- Existing stream conditions should be considered in evaluating potential cumulative effects of the individual THP. Harvest planning should account for this potential during evaluation of alternative silvicultural methods. (Richey, p.13)
- Timber harvest allocation systems are complex and should not be considered unless the need is shown to be critical. (Richey, p.13)
- Road systems should be planned to minimize total disturbance and avoid sensitive sites. New road standards in the forest practice rules should be evaluated before further regulation regarding road planning is proposed. (Richey, p.13)

The Appendix to Technical Rule Addendum #2 also describes the factors that can be used to evaluate the potential project impacts. Such factors include gravel embeddedness, pool filling, stream aggrading, bank cutting, bank mass wasting, downcutting, scouring, organic debris, stream-side vegetation, and recent floods. These factors can be examined in the field by experienced individuals to determine if the environmental setting has suffered from past projects and/or contains the ability to adsorb future projected impacts.

The RPF preparing the plan has surveyed other watercourse segments within the assessment area. CDF considered all these survey results to assess conditions in the entire assessment area. Information from all these assessment areas is combined like building blocks. This eventually gives CDF a thorough knowledge of the whole forested area of the drainage, and enables CDF to look up-stream and down-stream of each watershed assessment area.

If this project's residual impacts were great enough, after application of the CCRs and extra THP mitigations, to possibly combine in an adverse way with other past, present and future projects to cause a significant environmental effects, extra mitigations could have been applied to reduce any significant effect. However, CDF did not find that this project would have such an adverse effect. CDF found that SPI correctly complied with the rules in the discussion and identification of cumulative impacts.

SUMMARY AND CONCLUSIONS

The Department recognizes its responsibility under the Forest Practice Act (FPA) and CEQA to determine whether environmental impacts will be significant and adverse. In the case of the management regime which is part of the THP, significant adverse impacts associated with the proposed application over the 100-year sustained-yield planning horizon are not anticipated. Furthermore, based on the information provided in the Option "a" relative to increasing inventory and growth and research and modeling results reviewed by the Department, the Department has concluded that the impacts from implementation of this management regime will have a net benefit from a climate perspective.

CAL FIRE has considered that owners of large tracts of timberland (50,000 acres or more), including SPI, are required to have a management plan (an "option 'a' plan" or a Sustained Yield Plan) as per the Rules, code section 14 CCR 913.11[933.11, 953.11]. Growth and harvest must be balanced over time. The growth and yield calculations have been reviewed by the Department. These growth and yield plans demonstrate that for the majority of the land ownerships of 50,000 acres or greater that there will be an increase in standing volume and growth on these ownerships as a whole over time. Therefore the total amount of carbon stored in the forest trees over time will increase through the management regimes proposed under these plans. Each harvest leads to long term sequestration of carbon with the manufacture of wood products, primarily lumber. The Rules provide protection for soils, water and other resource values that also minimize the potential for loss of carbon storage elsewhere in the ecosystem (outside of the trees themselves). Protection measures for watercourses, sensitive wildlife species (fish and birds such as the spotted owl in particular) add to carbon storage through reduced harvest levels on portions of the managed landscapes.

CAL FIRE has considered that, if the stands were left unmanaged they would return to the "old growth" state and in that state would be sequestering more carbon. In isolation this argument may have some validity. However, timber management is not a closed system. Timber is harvested to meet a demand. In California the demand for wood products results in 5 to 7 billion board feet of lumber imports into the state each year. The impact of taking industrial timberlands out of production in California simply shifts the harvest to another state or country. Assuming a similar carbon balance for the stands where the imported products are grown and manufactured this would add additional use of fossil fuel for the transportation of the wood products into the state.

CAL FIRE has reviewed the potential impacts from the harvest and reviewed concerns from the public and finds that there will be no expected significant adverse environmental impacts from timber harvesting as described in the Official Response above. Mitigation measures contained in the plan and in the Forest Practice Rules adequately address potential significant adverse environmental effects.

CAL FIRE has considered all pertinent evidence and has determined that no significant adverse cumulative impacts will result from implementing this THP. Pertinent evidence includes, but is not limited to the assessment done by the plan submitter in the watershed and biological assessment area and the knowledge that CAL FIRE has regarding activities that have occurred in the assessment area and surrounding areas where activities could potentially combine to create a significant cumulative impact. This determination is based on the framework provided by the FPA, CCRs, and additional mitigation measures specific to this THP.

CAL FIRE has supplemented the information contained in this THP in conformance with Title 14 CCR Sec. 898, by considering and making known the data and reports which may have been submitted from other agencies that reviewed the plan; by considering pertinent information from other timber harvesting documents including THPs, emergency notices, exemption notices, management plans, etc. and including project review documents from other non- CAL FIRE state, local and federal agencies where appropriate; by considering information from aerial photos and GIS databases and by considering information from the CAL FIRE maintained timber harvesting database; by technical knowledge of unit foresters who have reviewed numerous other timber harvesting operations; by reviewing technical publications and participating in research gathering efforts and participating in training related to the effects of timber harvesting on forest values; by considering and making available to the RPF who prepares THPs, information submitted by the public.

CAL FIRE further finds that all pertinent issues and substantial questions raised by the public and submitted in writing are addressed in this Official Response. Copies of this response are mailed to those who submitted comments in writing.

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